ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 8.] [1908.

XLIV.—NOTES ON SEBAEA AND EXOCHAENIUM.

SEBAEA, *Soland., ex R. Br. Prodr.* 451.

The genus *Sebaea* forms the third genus of the tribe *Exaceae* in Bentham and Hooker's arrangement of the *Gentianaceae*, and also occupies a similar position in the *Gentianoideae-Gentianeae-Exacineae* of Engler and Prantl.

E. Meyer (*Comm.*, ii. p. 186) in 1837 established the genus *Lagenias*, which was upheld by Grisebach in *DC. Prodr.*, ix. p. 54, to contain *Sebaea pusilla*, Eckl., a peculiar little species which, however, is not sufficiently distinct from *Sebaea* to be worthy of generic rank. It was merged in *Sebaea* in the *Genera Plantarum*, (ii. p. 804), and this course has been followed by Schinz in *Bull. Herb. Boiss.*, ser. II., vi., 1906, p. 731, who places it in his section *Belmontia*, although he had upheld the genus in *Vierteljahrschr. Zürch. Naturf. Gesellsch.*, xxxvii. p. 308. Gilg, however, in *Engl. & Prantl, Pflanzenfam.*, iv., ii., p. 66, retains this monotypic genus. In the *Flora Capensis*, *Lagenias* is included under *Sebaea*.

The genus *Belmontia* was founded by E. Meyer in 1837 (*Comm.* ii. p. 183), to include certain plants formerly placed in *Sebaea*, in which the filaments of the anthers are inserted in the tube of the corolla, and not in the sinuses. This genus was maintained by Grisebach, in *DC. Prodr.*, ix. p. 54, and contained the three species *B. cordata*, E. Mey., *B. Ohlendorffii*, Griseb., and *B. spathulata*, E. Mey.; but the species *B. grandis*, E. Mey., was referred to *Exochaenium*, Griseb. (*DC. Prodr.*, ix. p. 55), in 1845.

In the *Genera Plantarum*, ii. p. 804, the genus is upheld, but includes Grisebach's *Exochaenium*, and is said to contain 5 or 6 Tropical and South African species. Gilg in *Engl. and Prantl, Pflanzenfam.* iv., ii., p. 66, retains the genus, also including *Exochaenium* and 14 or 15 species; two being from Madagascar, are considered to belong to *Belmontia*. The *Flora of Tropical Africa* follows the same course, and some 20 species are

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assigned to the genus. Schinz, in *Vierteljahrschr. Zürch. Naturf. Gesellsch.*, xxxvii., upholds the genus *Belmontia*; but in *Bull. Herb. Boiss.*, ser. II., vi., 1906, pp. 714–744, he merges *Belmontia*, E. Mey., in *Sebaea*, though he retains the species formerly included in that genus in his section '*Belmontia*.' At the same time (*ibid.*, p. 744) he keeps up *Exochaenium*, Griseb., and includes in that genus certain plants which had been placed under *Belmontia* by earlier writers. It should be mentioned that Rafinesque's name *Parasia* (*Rafin., Fl. Tellur.* iii., 1836, p. 78), is slightly earlier than *Belmontia*, E. Mey., since Meyer's *Comm.*, fasc. ii., containing the *Gentianaceae*, was published in 1837, and not in 1835, as stated by Schinz. Rafinesque's name is ignored by Gilg in *Engl. & Prantl, Pflanzenfam.*, iv., ii. p. 66, but it has been revived by S. L. Moore for his new species *Parasia Thomasii* in *Journ. Bot.*, xxxix., 1901, p. 260, and *Journ. Bot.*, xlv., 1907, p. 154. This species is now, however, included in *Sebaea*.

In the *Flora Capensis* the genus *Belmontia* is merged in *Sebaea*, and it seems hardly possible to maintain even the two sections *Eusebaea* and *Belmontia* of the latter genus, since two species, at least, occupy an intermediate position between these sections, and make it impossible to separate them by hard and fast lines.

Exochaenium was established as a genus by Grisebach in 1845, in *DC. Prodr.*, ix. p. 55, to receive Meyer's *Belmontia grandis* (E. Mey., *Comm.*, ii. p. 183); and two further species were added by Welwitsch in *Trans. Linn. Soc.*, xxvii., pp. 47, 48. As already stated, Bentham and Hooker f., Gilg in Engler and Prantl, Schinz in *Vierteljahrschr. Zürch. Naturf. Gesellsch.*, xxxvii., p. 330, *et seq.*, and Baker and Brown in *Flor. Trop. Africa*, iv., i., p. 552, *et seq.*, include *Exochaenium* under *Belmontia*; but Schinz in his last memoir in *Bull. Herb. Boiss.*, ser. II., vi., p. 744, restores the genus *Exochaenium*, in which he includes eight species. One of Welwitsch's species (*E. debile*, Welw.), is excluded and placed in *Sebaea*, and the remaining six have been taken out of *Belmontia*, E. Mey.

In the *Flora Capensis* the genus *Exochaenium* is upheld, the only South African representative being *E. grande*, Griseb. There are, however, several other species in Tropical Africa. The genus is characterised especially by the presence of a ring of disk-glands between the calyx and corolla, the stamens are inserted in the corolla-tube, and the style does not possess the biglandular swelling usually found in *Sebaea*. It is of interest to notice in passing that some of the species of *Exochaenium* have dimorphic flowers.

The genus *Sebaea* contains about 100 species, chiefly in South Africa, with a few in Tropical Africa, Madagascar, India, Australia, and New Zealand.

The representatives are annual, biennial, or perennial herbs, with erect or, more rarely, procumbent simple or branched stems with decurrent wings. In the flower the calyx-segments are keeled or more or less conspicuously winged. The anthers may be situated in the sinuses of the corolla or more or less deeply in the tube, and are usually provided with apical and sometimes also with paired basal glands. The style in most cases is furnished with a biglandular swelling (absent in the subsection *Lagenias*), which in a few species is more or less confluent with the stigma

(*e.g.*, *S. acutiloba*, *S. Zeyheri*, *S. micrantha*, and *S. intermedia*). The stigma is either exserted or included in the tube, but, except in the small group *Brevistylae*, is always situated above the anthers.

The genus can be subdivided into two well-marked sections according to whether the flowers are tetramerous or pentamerous. These sections correspond in part to the subsections *Tetrandria* and *Pentandria*, Schinz, of the section *Eusebaea*, Griseb. (*v.* Schinz in *Mitteil. Geogr. Ges. Lübeck*, xvii., 1903, p. 1 *et seq.*).

The section *Pentandria*, however, has been enlarged to include Schinz's section *Belmontia* (*v.* Schinz in *Bull. Herb. Boiss.*, ser. II., vi., p. 721), since the distinction between the sections *Eusebaea* and *Belmontia* seems somewhat of an artificial one.

In the *Flora Capensis* the enlarged section *Pentandria* has been subdivided; annuals are separated from perennials, and certain peculiar forms are kept apart as they appear to form somewhat isolated subsections. For convenience, and also to some extent in accordance with affinity, the subsections *Annuae*, *Perennes* and *Repentes* are broken up into smaller groups.

Sebaea, *Soland.*, *ex R. Br.*

Calyx segments, corolla lobes and anthers, 4.
Tetrandria, *Schinz.*

Calyx segments, corolla lobes and anthers, 5.
Pentandria, *Schinz* aug.

Calyx segments united to form a cylindrical tube for ¾ or more of their length; stamens inserted in corolla-tube.
Subsection (1). **Calycinae**, *Hill.*

Calyx segments more or less free, or if fused then for not more than half their length.

Erect annuals with 2–6, rarely more, pairs of leaves; style usually with biglandular swelling near the base, stigma above the anthers.
Subsection (2). **Annuae**, *Hill.*

Plants 1·5–15 cm., rarely 20 cm. high, simple, rarely branching from the base.

Leaves linear or ovate-lanceolate; anthers inserted in corolla-tube; style without biglandular swelling.
Group 1. **Lageniades**, *Hill.*

Leaves minute, more or less filiform; stamens in the sinuses; style usually with biglandular swelling.
Group 2. **Filiformes**, *Hill.*

Leaves ovate or cordate, usually conspicuous; stamens in sinuses or in corolla-tube; style usually with biglandular swelling.
Group 3. **Ovatae**, *Hill.*

Plants usually 10–30 cm., sometimes as much as 80 cm. high, with usually a more or less conspicuous false rosette of leaves; stems usually much branched from the base; stamens in sinuses or in corolla-tube.
Group 4. **Rosulatae**, *Hill.*

Erect perennials or biennials, with more than six pairs of leaves, branching from the base or from the leaf axils; stamens inserted either in the sinuses or tube of the corolla; style usually with biglandular swelling near the base, stigma above the anthers.

Subsection (3). **Perennes**, *Hill.*

Stems simple or branched from the base, and terminated by definite, more or less compact inflorescences.

Group 1. **Erectae**, *Hill.*

Stems with numerous axillary branches; inflorescences loose and somewhat paniculate.

Group 2. **Fastigiatae**, *Hill.*

Creeping or rosette-forming perennials with numerous spathulate or ovate leaves; flowers more or less sessile at the ends of branches, or borne on definite erect inflorescences.

Subsection (4). **Repentes**, *Hill.*

Stamens inserted either in sinuses or in corolla-tube; style with biglandular swelling, stigma above anthers.

Group 1. **Longistylae**, *Hill.*

Stamens inserted in corolla-tube; style without biglandular swelling, stigma below base of anthers.

Group 2. **Brevistylae**, *Hill.*

Sebaea (Tetrandria) ambigua, *Cham.* in Linnaea, vi., 1831, 346, et in viii., 52; Griseb. Gen. et Spec. Gent., 171, et in DC. Prodr. ix., 52; Schinz in Vierteljahrschr. Zürch. Naturf. Gesellsch. xxxvii., 315; Gilg in Eng. Bot. Jahrb., xxvi., 88; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 17.

S. aurea, (L) R.Br., var. *congesta*, E. et Z. in herb. *S. crassulaefolia*, Zeyh. in herb. *S. albens*, Zeyh. in herb. *S. pallida*, Zeyh. non E. Mey. in herb. *S. ambigua*, Cham., var. *gracilis*, Cham. in Linnaea, vi., 346; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii, 1903, 18, in part. *S. ambigua*, Cham., var. *crassa*, Cham. in Linnaea, vi., 346; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 18.

Cape Colony. Cape Div.: Flats between Maitland Cemetery and the sea, *Wolley Dod*, 3062! in moist places among *Restiaceae* near Zeekoe Valley, *Ecklon*, 77! roadside near Simonstown by lower north battery, *Wolley Dod*, 2013! Simons Bay, pastures by the sea shore, *MacGillivray*, 593! Chapman's Bay, border of a swamp, *MacGillivray*, 593 B! North Hoek, near the shore, *Milne*, 64! Strand near Green Point, *Wilms*, 3475, partly! Cape Point, alt. 800 ft., *Schlechter*, 7308! roadside near Little Lion, alt. 700–800 ft., *Wolley Dod*, 3273! Camps Bay, *Prior*! without precise locality, *Harvey*, 613! *Burke*! *Grey*!

The variety *gracilis*, Cham., named *Erythraea exacoides*, var. *major*, Eckl. on the label, appears to be merely a weak condition of the plant. Its elongated stem, lax cymes and smaller flowers are probably due to its having grown among taller plants in damp soil. There is no structural difference to separate it as a variety. It is included by Gilg together with Schlechter, 7308, as typical of *S. ambigua*, Cham. *S. gibbosa*, Wolley Dod, which is also placed by Schinz under *S. ambigua*, var. *gracilis*, is being restored to specific rank. The variety *crassa*, Cham., is not maintained.

Sebaea (Tetrandria) gibbosa, *Wolley Dod* in Journ. Bot. xxxix., 1901, 401.

Sebaea ambigua, Cham., var. *gracilis*, Cham. in Linnaea, vi., 346 ; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii, 1903, 18, in part.

Cape Colony. Cape Div. : Muizenberg Vley, by the railway, *Wolley Dod*, 2332 !

This species resembles *S. ambigua*, Cham., in the character of its leaves and calyx-segments, but differs markedly in its inflorescences and bracts, in which respects it approaches more nearly to *S. aurea*, R.Br.

Sebaea (Tetrandria) glauca, *A. W. Hill* [Gentianaceae-Exaceae]; species ex affinitate *S. ambiguae*, Cham., a qua cymis laxioribus, bracteis angustioribus et praesertim, more *S. pallidae*, E. Mey., segmentis calycis medio nec versus apicem alatis differt.

Annua, erecta. *Caulis* 10-15 cm. altus, simplex vel ramosus. *Folia* glabra, opposita, late ovata, obtusa, 8–10 mm. longa, 6–7 mm. lata, carnosa. *Flores* in cymas dense ramosas corymbiferas, cymis ultimis confertis dispositi ; rami 2–3 cm. longi, pedicelli brevissimi, bracteis rhomboides-ovatis vel anguste ovatis. *Calyx* 4–5 mm. longus, segmentis erectis obovatis concavis truncatis erosis apiculatis alatis, alae ·5–·75 mm. latae, medio latissimae. *Corollae* tubus 4·5 mm. longus ; lobi 4·5 mm. longi, 3 mm. lati, ovati, subapiculati. *Filamenta* ·75 mm. longa ; antherae 1·5–1·75 mm. longae, apice glandula stipitata conspicua instructae. *Stylus* circiter 4 mm. longus, medio biglandulosus, stigmate bilabiato.

Cape Colony. Cape Div. : Cape Peninsula, roadside near Little Lion, *Wolley Dod*, 3273 A !

It seems quite possible that this plant may be a hybrid between *S. ambigua* and *S. pallida*. It is very similar to *S. ambigua* in vegetative appearance. The cymes, however, are not collected into dense capitula and the bracts are narrower and less conspicuous than in *S. ambigua*. The calyx-segments have the wings broadest at the middle like those of *S. pallida*, whereas in *S. ambigua* there is a small thick apical wing.

Sebaea (Tetrandria) aurea, *R. Br.*, Prodr., 1810, 452 ; Griseb. Gen. et Spec. Gent., 167, et in DC. Prodr., ix., 52 ; Cham. in Linnaea, vi., 346 ; E. Mey., Comm. 184, ; Schinz in Viertel-Jahrschr. Zürch. Naturf. Ges., xxxvii., 315 ; Knobl. in Bot. Centralbl. lx., 324 ; Gilg in Engl. Bot. Jahrb., xxvi., 88 ; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 18. Pluk. Phytogr. Pl., t. 275, g. 3 ; (?) Burm. Rar. Agr., iii., t. 74, f. 4 ; Lam. Illustr. t. 80, f. 2.

Exacum sessile, L., Spec. Pl. ed. I., 1753, 112, in part ; ed. II., 163, in part ; non Griseb. Gen. et Spec. Gent., 1839, 113.

Exacum aureum, L., Suppl., 1781, 123.

Gentiana aurea, Thunb., Fl. Cap. ed. I., ii., 1818, 171.

Sebaea minima, Jaroscz, Pl. Nov. Cap., 1821, 11.

Sebaea aurea, R. Br., var. *genuina*, Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 19.

Sebaea aurea, R. Br., var. *genuina*, f. *Wurmbeana*, E. Mey., Comm., 1835, 185, (probably=var. *sulphurea*, Griseb. Gen. et Spec. Gent., 167) ; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 19.

Sebaea aurea, R. Br., var. *pallens*, Berg. in Griseb. Gen. et Spec. Gent., 1839, 167 ; Schinz in Mitteil, Geogr. Ges. Lübeck, xvii., 19.

. . . . . var. *pallens*, f. *cymosa* (Jaroscz Pl. Nov. Cap., 1821, 10) ; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 20.

. . . . . var. *pallens*, f. *gracilis*, Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 20.

Cape Colony. Clanwilliam Div. : Wupperthal, *Drège* ! Tulbagh Div. : near Tulbagh, *Pappe* ! Worcester Div. : Hex River Valley, 1700 ft., *Tyson*, 807 ! Cape Div. : Cape flats, near Rondebosch, *Burchell*, 158 ! *Harvey*, 616, Lion Mountain, *Ecklon*, 732 ! 733 ! near Cape Town, *Bolus*, 2876 ! *MacOwan & Bolus*, *Herb. Norm. Aust. Afr.* 365 ! Table Mountain, *Drège* ! slopes towards Camps Bay, *Wolley Dod*, 3330 ! Signal Hill, *Wolley Dod*, 3111 ! Sandown Road, *Wolley Dod*, 3204 ! Slangkop River, *Wolley Dod*, 3254 ! Fish Hoek Valley, *Wolley Dod*, 3438 ! Simons Bay, *MacGillivray*, 592 ! *Wright* ! Devil's Mountain, *Wilms*, 3436 ! Riversdale Div. : Heidelberg, alt. 500 ft., *Galpin*, 4335 ! near Zoetemelks River, *Burchell*, 6731 ! George Div. : near George, *Burchell*, 6008 ! 6060 ! Without precise locality, *Forster* ! *Wallich* ! *Thom* ! *Pappe* !

Sebaea aurea, *R. Br.*, var. **alata**, *A. W. Hill* ; varietas caulibus longis, internodiis elongatis segmentis calycis conspicue alatis alae ·4–·8 mm. latae, medio latissimae, distinctis.

Cape Colony. Clanwilliam Div. : Blue Berg, *Drège* ! Cape Div. : Sand flats between Tiger Berg and Blue Berg, *Drège* ! Cape Flats, *Zeyher*, 3420 ! Lion Mountain, *Drège* ! Stellenbosch Div. : Stellenbosch, *Marloth*, 3441 ! Without precise locality, *Pappe* !

S. aurea is a very variable plant in general appearance and in details of the flower ; sometimes flowers with entire and with bilobed stigmas are found to occur on the same individual. The forms which have here been included under *S. aurea* proper, can be easily distinguished from var. *alata* owing to the absence of a distinct wing to the calyx-segments. The variety *alata* approaches Meyer's *S. pallida*, which was included by Schinz as only another variety of *S. aurea*. *S. pallida*, E. Mey., however, is distinguished by the large wings to the calyx-segments, which are broadest at the base ; it is maintained here as a distinct species. *S. ochroleuca*, Wolley Dod, which is also closely allied to *S. pallida*, differs from that species in its smaller corolla lobes, anthers and style.

Sebaea (Tetrandria) Gilgii, *Schinz* in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 27.

Cape Colony. Cape Div. : on a flat on Muizenberg Mountain, near a stream, alt. 1300 ft., *Schlechter*, 150 !

This species is placed by Schinz in the subsection *Pentandria*, Schinz ; the flowers, however, appear to be always 4-merous, and this species must therefore be included in the subsection *Tetrandria*, Schinz. It is allied to *S. aurea*, but differs in the few-flowered inflorescences and in the calyx-segments with a wing most definite above the middle.

Sebaea (Tetrandria) pallida, *E. Mey.*, Comm., 1835, 185.

Sebaea aurea, var. *pallida*, Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 20.

CAPE COLONY. Tulbagh Div.: Tulbagh Kloof, alt. 300 ft., *Bolus*! Malmesbury Div.: near Mooresburg, *Bolus*, 9,992! Cape Div.: Fish Hoek Valley, *Wolley Dod*, 3437! Cape Flats, *Wolley Dod*, 425! Flats between Cape Town and Tyger Valley, *Drège*! Lion Mount, alt. 100-200 ft., *Drège*! *Prior*! *Bolus*, 7,212! Simon's Bay, *Wright*, 98! Swellendam Div.: mountains along the lower part of the Zondereinde River, *Zeyher*, 1187 partly!

This species can be easily distinguished from *S. aurea*, with which it has been included by Schinz, by the prominent wings of the calyx widest at the base, and by the larger and more prominent corollas.

Sebaea (Pentandria) compacta, *A. W. Hill* [Gentianaceae-Exaceae]; species distinctissima, nulli arcte affinis, foliis bracteisque lineari-lanceolatis acutis vel acuminatis calyce tubuloso insignis.

Perennis vel annuus (?), caespitosus. *Caulis* 5–10 cm. altus, ramis plurimis dense intricatis. *Folia* opposita, pauca, inferiora parva, superiora bracteaeque majores conspicua, lineari-lanceolata vel rarius ovato-lanceolata, acuta vel acuminata, 3 mm.–2 cm. longa, 1–4 mm., rarius 5 mm. lata, subcarnosa. *Flores* numerosi, in cymas numerosas ramis plurimis dispositi, bracteae lineari-lanceolatae, acutae, circiter 1·2 cm. longae. *Calyx* 1·3–1·5 cm. longus, segmentis carinatis in tubo elongato paulo inflato ·9–1·1 cm. longo connatis, partibus liberis 4 mm. longis lanceolatis acutis. *Corollae* tubus 1·0–1·2 cm. longus; lobi 6–9 mm. longi, 3–5·5 mm. lati, obovato-oblongi, apiculati vel subacuti. *Filamenta* brevissima, infra sinos corollae circiter ·5 mm. inserta; antherae 2–2·5 mm. longae, apice glandula parva basi glandulis minutis vel nullis instructae. *Stylus* 7 mm. longus versus basin biglandulosus, glandulae conspicuae 1–2 mm. longae; stigmate paullo bilabiato. *Capsula* ovoidea.

CAPE COLONY. Graaff Reinet Div.: Dutoits (Farm ?) under Compass Berg, in cultivated ground, alt. 5500–6000 ft., *Bolus*, 1853! Middelburg Div.: near Middelburg, *Denoon*, 37 (*in Herb. Guthrie*, 1043)! *Shaw*! Colesberg Div.: near Colesberg, *Shaw*! Colesberg Kopje, *Mrs. Barber*, 10!

GRIQUALAND WEST. Dutoits Pan, near Kimberley, *Mrs. Barber*, 21!

ORANGE RIVER COLONY. Between Bloemfontein and Petrusburg, *Miss Kensit* (*in Herb. Bolus*), 12992!

BECHUANALAND. By the Mashowa River, near Takun, *Burchell*, 2252/4!

This very distinct plant was first collected by W. J. Burchell in 1812, and though it has been found several times since, and is a striking and beautiful plant, it does not appear to have been described before.

The plant, as preserved at Kew and in Dr. Bolus' herbarium, has somewhat the appearance of a densely-branched specimen of *Exochaenium primulaeflorum*, Welw., or of *Lagenias*, E. Mey.

A short central axis gives off much-branched axillary shoots, which result finally in a cushion-shaped plant covered with conspicuous bright yellow flowers. In a description on the sheet in Dr. Bolus' herbarium the plant is called a stunted sub-shrub. The plant is provided with mycorrhiza and has short thick roots. In connection with the occurrence of mycorrhiza in this species and possibly also in *Exochaenium*, attention may be drawn to the cases of *Obolaria* and *Bartonia* described by Holm in *Ann. Bot.* xi., 369, and xx., 441. The first two or three pairs of leaves are very small, as in *Exochaenium*, whilst the upper two or three pairs, and the numerous bracts, which are indistinguishable from the leaves, are relatively large. According to the label on Barber's specimen, No. 21, this species is found "studding the flats in places where water occasionally lodges."

As regards the position of the anthers, this plant belongs to the *Belmontia* section of the genus *Sebaea*, and the stigma, with its large biglandular swelling, is also like that found in the genus. The long tubular and slightly inflated calyx, and the elongate linear-lanceolate leaves separate this plant from all others, and perhaps constitute characters of generic value. Should it be found after further field work that it is desirable to raise this plant to generic rank it would also become necessary to restore the genus *Lagenias*, whose relationships to *Sebaea* are of a character very similar to those between this genus and *S. Compacta*.

Sebaea (Pentandria) mirabilis, *Gilg* in Engl. Bot. Jahrb., xxvi., 1898, 92; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 35.

Sebaea pratensis, Gilg in Engl. Bot. Jahrb., xxx., 377, 378, figs. A—F; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 38; Baker and Brown in Flor. Trop. Africa, iv., 1, 550.

CAPE COLONY. Transkei: swampy places near Tsomo, *Mrs. Barber*, 845! hillside near Kentani, 1000 ft., *Miss Pegler* 1187! Tembuland: Bazeia Mountain, 4000 ft., *Baur*, 621! Griqualand East: Maclear Distr., grassy slopes on the farm "Woodlands," alt. 5600 ft., *Galpin*, 6772!

NATAL. Mid Illovo, amongst grass, alt. 1000–2000 ft., *Wood*, 1884 (*in Herb. Kew*)!

ORANGE RIVER COLONY. Without precise locality, *Cooper*, 2756!

TRANSVAAL. Lydenburg Distr., Dolomite of Spitz-Kop, *Wilms*, 971!

TROPICAL AFRICA. Nyasaland: Nkinga, alt. 2500 m., *Götze*, 916!

S. mirabilis, with which *S. pratensis*, Gilg, has been united, shows close relationship to *S. exigua*, *S. filiformis*, and *S. Welwitschii*. In all these plants the wings of the stem are minutely glandular, especially near its base. The stems are usually slender, with long internodes; the leaves are very small, and the plants are probably furnished with mycorrhiza or may be partial parasites. *S. Junodii* is doubtless closely allied to these species, and they form a small sub-group easily distinguished by their vegetative characters. *S. mirabilis* differs from the other

species in the possession of a conspicuous wing to the calyx-segments, and is usually a stronger plant. In *S. exigua*, and in *S. filiformis* to a less extent, the calyx-segments are partially fused to form a campanulate cup.

Sebaea (Pentandria) pygmaea, *Schinz* in Bull. Herb. Boiss. ser. II., vi., 1906, 740.

It seems very probable that further investigation in the field will show that this species is only a small, stunted or alpine form of *S. erosa*, Schinz. The chief points of difference consist in the smaller anthers and style, and in the absence of erose toothing to the corolla lobes in *S. pygmaea*. In this connection it is to be noticed that *S. pygmaea* has been collected from a considerably greater altitude than *S. erosa*.

Sebaea (Pentandria) conspicua, *A. W. Hill* [Gentianaceae-Exaceae] ; species distincta ex affinitate *S. rotundifolia*, A. W. Hill, a qua foliis spathulatis segmentis calycis carinatis antheris uniglandulosis stigmate capitato differt.

Annua (?), erecta vel paullo repanda. *Caulis* 7–10 cm. altus, simplex vel ramosus. *Folia* opposita, magis minusve subrosulata, obovato-oblonga vel spathulata, fere petiolata, 2–3·5 cm. longa, ·9–1·4 cm. lata, subcarnosa. *Flores* in cymas ramosas corymbiferas multiflores dispositi ; rami ·8–1·2 mm. longi, pedicelli circiter 1 mm. longi. *Calyx* 6–7 mm. longus, segmentis ellipticis acutis carinatis. *Corollae* tubus circiter 6 mm. longus ; lobi 1–1·2 cm. longi, 3-3·5 mm. lati, anguste ovati, elongati, subacuti vel apiculati. *Filamenta* 1 mm. longa ; antherae 3 mm. longae, apice glandula conspicua instructae. *Stylus* 6-7 mm. longus, prope basin biglandulosus, stigmate capitato.

ORANGE RIVER COLONY. Marsh near Harrismith, alt. 7000 ft., *Sankey*, 173 !

A pretty species, with comparatively large bright-yellow flowers borne on more or less dense and many-flowered corymbose inflorescences ; the leaves tend to be gathered into false radical rosettes with one or two pairs of fairly large leaves on the erect flowering branches.

Sebaea (Pentandria) elongata, *E. Mey.*, Comm., 1837, 184 ; Gilg in Engl. Bot. Jahrb., xxvi., 96 ; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 41.

Sebaea cuspidata, Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 28.

CAPE COLONY. Riversdale Div. : Kampsche Berg, *Burchell*, 7085 ! mountains near Riversdale, 1500 ft., *Schlechter*, 1840 ! Oudtshoorn Div. : Robinson Pass, *Bolus*, 12993 ! Knysna Div. : on a mountain near Roodemuur, between Plettenbergs Bay and Lange Kloof, 2000–2500 ft., *Drège*, 2827 ! Uniondale Div. : mountains near Avontuur, *Bolus*, 2402 !

A distinct species with its false rosette of closely placed leaves at the base of the tall erect flowering stems. This species with which *S. cuspidata*, Schinz, has been united shews a considerable range of variation both in the size of the corolla and in other parts of the flower, but as there is a regular gradation of forms between

the larger-flowered specimens typical of the original *S. elongata* and the smaller-flowered forms which were referred by Schinz to *S. cuspidata*, there appears to be no good reason for retaining *S. cuspidata*, Schinz, as a distinct species.

Sebaea (Pentandria) rotundifolia, *A. W. Hill* [Gentianaceae-Exaceae]; species *S. elongatae*, E. Mey., et *S. Conrathii*, Schinz, proxima, a *S. elongata*, foliis orbicularibus cymis paucifloribus antheris triglandulosis stigmate clavato differt; a *S. Conrathii* foliis orbicularis segmentis calycis alatis floribus majoribus stigmate clavato differt.

Annua (?), erecta. *Caulis* circiter 12 cm. altus, simplex. *Folia* opposita, fere omnia sub-rosulata, orbicularia vel orbiculari-ovata, obtusa, 2·5–3·5 cm. longa, 1·5–3 cm. lata. *Flores* in cymam terminalem umbelliformem paucifloram dispositi; rami ·75–1·5 cm. longi, pedicelli 2 mm. longi, bracteis subulatis inconspicuis. *Calyx* 6 mm. longus, segmentis erectis elliptico-lanceolatis acutis alatis, alae ·5 mm latae, medio latissimae. *Corollae* tubus circiter 8 mm. longus; lobi 1·2 cm. longi, 5 mm. lati, ovati, unguiculati, obtusi. *Filamenta* 1·5 mm. longa; antherae 2·75 mm. longae, apice uni- basi bi-glandulosis instructae. *Stylus* 8–9 mm. longus, prope basin biglandulosus, stigmate clavato.

NATAL. Drakensberg, *Buchanan*, 31!

Sebaea (Pentandria) pentandra, *E. Mey.*, Comm. 1837, 184.

Sebaea gariepina, Gilg in Eng. Bot. Jahrb. xxvi., 1898, 90; Schinz in Mitteil. Geogr. Ges. Lübeck xvii., 1903, 41.

In E. Meyer, *Comm.*, vol. i., fasc. ii., 1837, p. 154, four localities (*a*, *b*, *c*, *d*) are given for *S. pentandra* collected by Drège and in *Zwei Pflanzengeogr. Doc.* (Meyer), pp. 93 and 219, a fifth locality (*e*) is referred to for *S. pentandra*. The localities, according to *Zwei Pflanzengeogr. Doc.*, should be as follows, and not as in Meyer's *Comment.*

(*a*) Winterveld & Nieuweveld.
(*b*) ad fontem Wonderheuvel.
(*c*) Garip Sandhügel am rechten Ufer des Flusses bei Verleptpram (v. Meyer, *Zwei Pflanzengeogr. Doc.*, 93).
(*d*) Zuurbergen.
(*e*) Inter Gekau et Basche.

Gilg in Engl. Bot. Jahrb. xvi., 1898, pp. 90, 91, states that he found three different plants in Meyer's herbarium under *S. pentandra*; he accordingly distributed them, retaining the plant from Gekau and Basche (*e*) under *S. pentandra*, and making a new species *S. gariepina*, Gilg, of the plant from near Verleptpram (*c*), whilst the third specimen from Zuurberg (*d*) is referred to *S. ramosissima*, Gilg.

From an examination of the type specimen in Meyer's herbarium at Lübeck, it has not been found possible to maintain the species *S. gariepina*, since this specimen from Garip (*c*) exactly equals *S. pentandra*, E. Mey. (*a*) from Nieuweveld at Kew.

With regard, however, to the localities for *S. pentandra* sensu stricto, a mistake appears to have arisen in the Berlin herbarium,

where on Drège's label the letter (*b*) has been read as (*e*) and the locality "Gekau and Basche" has accordingly been placed on the label instead of "Wonderheuvel."

The specimen from "Gekau-Basche" (No. 4920) at Lübeck agrees with the Berlin specimen from Wonderheuvel.

The Drège plants distributed under the name *S. pentandra*, E. Mey., are arranged as follows in the *Flora Capensis* :—

S. pentandra, E. Mey.; "Ad fontes Nieuweveld" (*a*); "Wonderheuvel" (*b*); "Garip" (*c*); and, "inter Gekau et Basche" (*e*).

S. ramosissima, Gilg; Zuurbergen (*d*).

It is of interest to notice that the floral structure of *Sebaea primulina*, A. W. Hill, from Kuruman, agrees very closely with that of *S. pentandra*, the chief difference being that the filaments of the anthers are inserted in the corolla-tube (section *Belmontia*) and not in the sinuses. In a few other cases there are equally striking cases of parallel species in the sections *Eusebaea* and *Belmontia* to which attention will be drawn.

Sebaea (Pentandria) primulina, *A. W. Hill* [Gentianaceae-Exaceae]; species distincta ex affinitate § *Belmontiae*, Schinz, foliis rosulatis, caulibus floriferis erectis singulis vel plurimis, segmentis calycis medio latissime alatis filamentis antherarum in tubo corollae insertis antheris conspicue triglandulosis insignis.

Annua, erecta. *Caulis* brevis, foliis rosulatim dispositis, caulibus floriferis erectis 4–13 cm. altis singulis vel plurimis. *Folia* opposita, radicalia ovata, subacuta, ·8–1·6 cm. longa, 4–7 mm. lata, subpetiolata, carnosa; caulina, par singulum, ovato-oblonga, subacuta. *Flores* in cymas laxifloras floribus paucis vel plurimis dispositi; rami ·8–2·5 cm. longi, pedicelli ·5–1 mm. longi, bracteis ovato-oblongis acutis vel linearibus. *Calyx* 7–8 mm. longus, segmentis ovato-lanceolatis acutis infra paullo connatis, anguste alatis, alae medio latissimae. *Corollae* tubus 1 cm. longus, lobi 7–8 mm. longi, 3–4 mm. lati, spathulati, obtusi. *Filamenta* ·5 mm. longa, in tubo corollae circiter ·75 mm. infra sinos inserta; antherae 2–3 mm. longae apice basique glandulis (3) conspicuis instructis. *Stylus* 8–9 mm. longus, versus basin biglandulosus; stigmate clavato magis minusve bilabiato.

BECHUANALAND. By the Moshowa River, near Takun, *Burchell*, 2252-5 ! between Kuruman and the Vaal River, *Cruickshank* (*in Herb Bolus*), 2540 !

This species bears a certain resemblance to specimens of *S. pentandra*, E. Mey., especially those collected near Kimberley by Flanagan, in the calyx-wings and in the anthers with their three glands. The position of the filaments, and the radical leaf-rosette, afford characters for separating this species from *S. pentandra*.

Sebaea (Pentandria) Schoenlandii, *Schinz* in Bull. Herb. Boiss. Ser. II., vi., 1906, 741.

Some confusion has occurred between this species and *S. sedoides*, Gilg, from which it differs in its relatively long internodes, ovate-lanceolate leaves and smaller and more compact inflorescences.

S. Schoenlandii has been placed by Schinz in his section *Belmontia*, but it has been found that the distinction between the sections *Eusebaea* and *Belmontia* apparently breaks down in this species, as in some examples the filaments of the anthers are inserted in the corolla-tube, whilst in others they occur in the sinuses. It has not been found possible to separate the individuals included under this species into two distinct species on this one character, or to include those forms with the anthers in the sinuses under *S. sedoides*, to which they are closely allied, and leave the remainder, with the filaments inserted in the tube as *S. Schoenlandii*.

The specimens included in this species are :—

NATAL. Mount Moreland, alt. 500 ft., *Wood*, 1386 ! without precise locality, *Cooper*, 2750 partly ! Zululand : Ngoya, *Wylie* (*in Herb. Wood*), 7570 ! 8497 !

ORANGE RIVER COLONY. Without precise locality, *Cooper*, 2751 !

TRANSVAAL. Witwaters Rand, *Hutton*, 880 !

Of these, *Cooper*, 2750, 2751, were placed by Schinz (*Mitteil. Geogr. Ges. Lübeck*, xvii., 1903, 43), under *S. sedoides*, Gilg. In 2751, however, the filaments of the anthers are inserted in the sinuses, and in 2750 in the tube of the corolla, otherwise they are indistinguishable. In all the other specimens the insertion of the filaments is in the tube of the corolla.

Sebaea (Pentandria) acuminata, *A. W. Hill* [Gentianaceae-Exaceae] ; species ex affinitate *S. longicaulis*, Schinz, a qua foliis angustioribus, cymis multifloribus, floribus minoribus, antheris brevissimis subsessilibus praesertim differt.

Perennis vel biennis, erecta. *Caulis* 50–65 cm. altus, simplex. *Folia* opposita, numerosa, infra ovato-lanceolata internodis aliquanto elongatis, supra lineari-lanceolata, conferta, acuta, marginibus reflexis, ·9–1·3 cm. longa, 2–4 mm. lata, subcoriacea. *Flores* in cymas terminales multifloras dispositi ; rami 1·0–1·7 cm. longi, tenues, pedicelli circiter 1 mm. longi, bracteis linearibus. *Calyx* 7 mm. longus, segmentis erectis anguste elliptico-lanceolatis acuminatis concavis anguste alatis. *Corollae* tubus 4–4·5 mm. longus ; lobi 5 mm. longi, 1·5–2 mm. lati, elliptico-obovati, obtusi. *Filamenta* brevissima, antherae 1-1·5 mm. longae, apice glandula instructae. *Stylus* 4 mm. longus, infra medium biglandulosus ; stigmate capitato-clavato.

NATAL. Near Boston, alt. 3,000–4,000 ft., *Wood* (*in Herb. British Museum*) !

In general habit this species is closely allied to *S. longicaulis*, Schinz, and is labelled on the sheet as being the same as *Wood*, 1844. It is, however, a much more slender plant, differing from *S. longicaulis* in its narrow leaves, acuminate sepals, as well as in the smaller proportions of the corolla and the short, nearly sessile, anthers.

Sebaea (Pentandria) erecta, *A. W. Hill* [Gentianaceae-Exaceae] ; species *S. longicauli*, Schinz, et *S. grandiflorae*, Schinz, proxima ; a *S. longicaule* foliis, segmentis calycis distincte alatis stigmate capitato, a *S. grandiflora* foliis segmentis calycis distincte alatis stylo biglanduloso differt.

Perennis vel biennis, erecta. *Caulis* 40–50 cm. altus, simplex, rhizomate repente ramoso subterraneo. *Folia* opposita, numerosa, infra magis minusve dense, supra sparse disposita, 8–10 mm. longa, 6–9 mm. lata, late ovata vel cordata, subacuta vel apiculata, subcoriacea. *Flores* in cymas terminales, paucifloras 5–9 dispositi, rami 1·2–1·8 cm. longi, pedicelli 2–4 mm. longi, bracteis subulatis vel linearibus. *Calyx* 1 cm. longus, segmentis erectis 4 mm. latis ovato-oblongis apiculatis conspicue alatis, alae ·5 mm. latae, medio latissimae. *Corollae* tubus 8 mm. longus, lobi 1·1–1·2 cm. longi, 5 mm. lati, obovato-oblongi, obtusi. *Filamenta* 2 mm. longa; antherae 3·5 mm. longae, apice glandula minuta instructae. *Stylus* 1 cm. longus, prope basin biglandulosus; stigmate capitato.

TRANSVAAL. Carolina District: Liliefontein, *Nicholson* (*in Transvaal Herbarium*), 4307!

This species with *S. grandiflora*, Schinz, *S. longicaulis*, Schinz, *S. acuminata*, A. W. Hill, and *S. macrantha*, Gilg, form a small group of closely allied species.

Sebaea (Pentandria) longicaulis, *Schinz* in Bull. Herb. Boiss. II., 1894, 219; Gilg in Engl. Bot. Jahrb., xxvi, 1898, 94; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 42.

Sebaea Woodii, Gilg in Engl. Bot. Jahrb., xxvi., 94; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 42.

Sebaea crassulaefolia, Cham. et Schlecht., var. *lanceolata*, Schinz in Vierteljahrschr. Zürch. Naturf. Gesellsch., xxvii., 1891, 323.

Sebaea macrosepala, Gilg in Engl. Bot. Jahrb., xxvi., 91; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 48.

CAPE COLONY. King Williamstown Div.: Perie Bush, *Scott Elliot*! Griqualand East: Mount Malowe, alt. 5500 ft., *Tyson*, 3096!

NATAL. In a swamp near Karkloof, alt. 3000–4000 ft., *Wood*, 4447! Byrne, in damp soil, alt. 3000 ft., *Wood*, 1844! Weston, Mooi River, *Rehmann*, 7348! near Ladysmith, *Gerrard*, 835! Benvie, *Wylie* (*in Herb. Wood*), 7875!

This species appears to be closely allied to *S. grandiflora*, Schinz, and also to *S. erecta*, A. W. Hill, and *S. acuminata*, A. W. Hill, both in floral and in vegetative structure. The leaves in *S. longicaulis* tend to be ovate below, becoming lanceolate above, whilst in *S. grandiflora* they are cordate or broadly orbicular ovate; in this latter species the stigma is capitate, and the stylar swelling is not always developed. It seems possible that intermediate forms may be found which will link together *S. longicaulis* and *S. grandiflora*.

Sebaea (Pentandria) macrophylla, *Gilg* in Engl. Bot. Jahrb. xxvi., 1898, 96; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 45.

Sebaea wittebergensis, Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 45.

Sebaea hymenosepala, Gilg ex Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 49 in part.

Cape Colony. King Williamstown Div.: Buffalo, near Perie, 4000 ft., *Tyson*, 1047 ! Kaffraria, *Mrs. Barber* ! Griqualand East; summit of Mount Currie, alt. 6500 ft., *Tyson* (*in MacOwan & Bolus, Herb. Norm. Austr.-Afr.*) 1289*b* !

Orange River Colony. Kadzi Berg, Witteberg Range, *Rehmann*, 3999 ! Basutoland, *Cooper*, 713 !

Transvaal. Drakensberg Range, near Pilgrims Rest, in damp valleys, alt. 5000 ft., *McLea* (*in Herb. Bolus*), 171 ! 3099 !

I have been unable to find any valid distinction between *S. macrophylla*, Gilg, and *S. wittebergensis*, Schinz, and have therefore united them under one species.

Sebaea (Pentandria) crassulaefolia, *Cham. et Schlecht.* in Linnaea, i., 1826, 193; Schinz in Vierteljahrschr. Zürch. Naturf. Gesellsch., xxxvii., 323, (in part); Griseb. Gen. et Spec. Gent. 168, et in DC. Prodr. ix., 53; Gilg in Engl. Bot. Jahrb. xxvi., 97, (in part); Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 50 (in part); non Baker et Brown in Flor. Trop. Africa, iv., 1, 547.

Sebaea hymenosepala, Gilg ex Schinz Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 49 (in part).

Cape Colony. Knysna Div.: Plettenbergs Bay Poort, *Mund and Maire* ! Uitenhage Div.: near Uitenhage ? alt. 1000-3000 ft., *Zeyher* ! *Ecklon-Zeyher* ! British Kaffraria, *Cooper*, 406 ! Without precise locality, *Ecklon*, 660 !

Sebaea crassulaefolia, Cham. et Schlecht., has been the favourite repository for most of the larger Sebaeas, and out of the material so placed several distinct species have been made. Amongst these may be mentioned *S. Brehmeri*, Schinz, which differs in the larger floral structures, capitate stigma and also in the numerous narrowly ovate, acute bracts of the inflorescence. *S. crassulaefolia*, as now restricted, is a somewhat slender plant, with lax, much branched and many-flowered inflorescences and with keeled or very narrowly winged calyx-segments and a shortly clavate stigma. In the *Flora of Tropical Africa* certain specimens are referred to *S. crassulaefolia* in the wider sense; they are however quite distinct from this species. It seems fairly certain that *S. crassulaefolia* does not occur outside Cape Colony.

Sebaea (Pentandria) leiostyla, *Gilg* in Engl. Bot. Jahrb. xxvi., 1898, 97; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 32; Baker et Brown in Flor. Trop. Africa, iv., 1, 548.

Sebaea transvaalensis, Schinz in Mitteil, Geogr. Ges. Lübeck, xvii., 49.

Sebaea sedoides, Gilg; Schinz in Mitteil. Geogr; Lübeck, xvii., 43, in part.

Orange River Colony. Harrismith, *Sankey*, 175 ! Bethlehem, *Richardson* ! and without precise locality, *Cooper*, 2752 ! 2759 !

Transvaal. Houtbosch Berg, alt. 6400 ft., *Schlechter*, 4720 ! near Pretoria, damp places, alt. 4600 ft., *Schlechter*, 4157 ! Hooge Veld, between Trigardsfontein and Standerton, *Rehmann*, 6755 ! Reit Spruit, *Krook*, 2016 ! Ermelo Experimental Farm, dry laagte, alt. 5400 ft., *Burtt Davy*, 7710 ! near Vereeneging, in springy places, near Vlei, *Burtt Davy* !

NATAL. Ranges 30–60 miles from the sea, alt. 2–3000 ft., *Sutherland*! summit of Amajuba Hill, alt. 8000 ft., *Burtt Davy*, 7747 B! and without precise locality, *Gerrard*, 1983!

NYASALAND. *Buchanan*, 200! 270! North Nyasaland, *Whyte*! Shire Highlands, *Buchanan*, 208 A! near Blantyre, *Last*! *Adamson*, 236!

In this species the biglandular swelling on the style is usually very small and sometimes undeveloped. No character of any importance can be found to separate *S. leiostyla* and *S. transvaalensis*. *S. leiostyla* has therefore an extended range from Nyasaland to Natal through the Transvaal and into Orange River Colony. *Buchanan*, 270, the type of Gilg's species, appears to agree in all essentials with the other specimens quoted. Schlechter's plant 4720, collected in the Houtbosch Berg, which is the type of *S. transvaalensis*, Schinz, differs from other specimens only in its more bushy habit and numerous axillary inflorescences.

Sebaea (Pentandria) imbricata, *A. W. Hill* [Gentianaceae-Exaceae]; species distincta *S. Rehmannii*, Schinz, et *S. polyanthae*, Gilg, proxima cymis multifloris corymbosis segmentis calycis longioribus late imbricatis, prope basin nec versus medium alatis differt.

Perennis vel biennis, erecta. *Caulis* 17-25 cm. altus, simplex, versus apicem in cymas axillares ramosus. *Folia* opposita, numerosa, conferta internodis 6–12 mm. longis, orbiculari-ovata vel cordata, apiculata, 8–9 mm. longa, 11–9 mm. lata, sub-coriacea. *Flores* in cymas densas multifloras corymbosas dispositi; rami 6–8 mm. longi, pedicelli circiter 2 mm. longi, bracteis foliaceis ovatis vel lineari-ovatis. *Calyx* 9–10 mm. longus, segmentis erectis 3–4 mm. latis ovato-lanceolatis acuminatis ad basin late imbricatis alatis, alae 1 mm. latae ad basin latissimae. *Corollae* tubus 6–6·5 mm. longus; lobi 6·5–8 mm. longi, 3 mm. lati, eliptico-obovati, apiculati. *Filamenta* ·5–·75 mm. longa; antherae 2·5 mm. longae, apice glandula parva instructae. *Stylus* 7–8 mm. longus, prope basin biglandulosus; stigmate capitato-clavato.

NATAL. Summit of Amajuba Hill, alt. 8000 ft., *Burtt Davy*, 7747 C.!

Sebaea (Pentandria) hymenosepala, *Gilg*, in Engl. Bot. Jahrb, xxvi., 1898, 89; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903. 49, in part.

Sebaea semialata, Gilg in Engl. Bot. Jahrb., xxvi., 1898, 97; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 46.

Biennis vel annua (?), erecta. *Caulis* 15–28 cm. altus, e basi ramosus. *Folia* opposita, infra conferta, late orbiculari-ovata vel subreniformia, obtusa vel apiculata, 6–9 mm. longa, 8 mm.–1·2 cm. lata, subcoriacea. *Flores* in cymas numerosas axillares multifloras conferti; rami ·5–1·5 cm. longi, pedicelli 2–5 mm. longi, bracteis anguste ovatis vel linearibus. *Calyx* 5–8 mm. longus, segmentis erectis ovato-lanceolatis acutis alatis; alae membranaceae, ·75–1 mm. latae, sub medium latissimae. *Corollae* tubus 5–7 mm. longus; lobi circiter 6 mm. longi, 2–4 mm. lati, spathulati, paullo cucullati. *Filamenta* ·5–1·5 mm. longa; antherae 2–3 mm. longae apice unibasi minute bi-glandulosae. *Stylus* 6–7 mm. longus, versus basin biglandulosus; stigmate capitato vel brevissime clavato.

Cape Colony. Alexandria Div.: Zuurberg Range, *Bolus*, 9122 ! at Doon Nek and Bontjes River, alt. 2000–3000 ft., *Drège* ! Albany Div.: near Grahamstown on mountain slopes, in moist places, alt. 2200 ft., *Galpin*, 375 ! *Atherstone*, 477 ! *Misses Daly & Sole*, 468 ! *Pappe* ! Stockenstrom Div.: Katberg, *Shaw* ! Komgha Div.: between Sandplaat and Komgha, alt. 2200–3200 ft., *Drège*, 4921 ! Transkei: Kreili's Country, *Bowker* ! Valleys near Kentani, alt. 1000 ft., *Miss Pegler*, 906 ! Pondoland: near Umtamvuna, *Bachmann*, 1040 ! without precise locality, *Krebs*, 232 ! Griqualand East, Maclear Div.: near Klein Pot River, alt. 4500 ft., *Galpin*, 6774 !

Sebaea hymenosepala, *Gilg*, var. **grandiflora**, *A. W. Hill*, a specie typica foliis numerosis reniformibus vel orbicularibus, internodis supra elongatis, cymis paucifloris aliquanto pendulis, segmentis calycis latioribus et lobis corollae 9 mm. longis, 6 mm. latis orbiculari-ovatis praecipue differt.

Cape Colony. Mount Fletcher Div.: Doodmans Kraus Mountain, Drakensberg Range, alt. 8850 ft., *Galpin*, 6776 !

This variety is most closely related to Shaw's specimen from the Katberg.

Sebaea semialata, Gilg, has been united to *S. hymenosepala*, Gilg, after careful examination of all available material. The principal difference between the two species in the original descriptions appears to be in the anther-glands. *S. hymenosepala* is stated to have three anther-glands, whilst only one was found in *S. semialata*. The presence or absence of basal glands, however, appears to be liable to variation, and is not a sufficient justification for maintaining both species; they have therefore been united under the name *S. hymenosepala*, Gilg. This species is evidently closely allied to *S. Rehmanii*, Schinz, from the Transvaal. Both these species again are very similar to *S. Rudolfii*, Schinz, (§ *Belmontia*) in general appearance, but that is easily distinguished by the insertion and character of the anthers.

Of the other plants referred by Schinz (in Mitteil. Geogr. Ges. Lübeck, xvii., 49) to *S. hymenosepala*, Gilg, *MacOwan*, 16, has been referred to *S. fastigiata*, A. W. Hill; *Cooper*, 406, to *S. crassulaefolia*, Cham. et Schlect.; and *Cooper*, 713, to *S. macrophylla*, Gilg.

Sebaea (Pentandria) fastigiata, *A. W. Hill* [Gentianaceae-Exaceae]; species ex affinitate *S. hymenosepalae*, Gilg, caulibus multi-ramosis, foliis ovatis acutis antheris que longioribus praesertim differt.

Perennis vel biennis, erecta. *Caulis* 25–35 cm. altus ramis axillaribus numerosis instructus. *Folia* opposita, numerosa, conferta, late ovata, acuta, 8-10 mm. longa, 8–14 mm. lata, magis minusve coriacea. *Flores* in cymas axillares numerosas paucifloras laxe dispositi, ramis axillaribus elongatis foliaceis; rami inflorescentiae ·7–1·5 cm. longi, pedicelli 2–10 mm. longi, bracteis late ovatis acutis vel acuminatis. *Calyx* 7–9 mm. longus, segmentis erectis ovato-lanceolatis acuminatis alatis, alae ·5–·75 mm. latae, medio latissimae. *Corollae* tubus circiter 7 mm. longus; lobi 7–8 mm. longi, 3·5–5 mm. lati, obovati. *Filamenta* 1–1·5 mm.

longa; antherae 3–4 mm. longae, apice glandula basi glandulis nullis vel minutis instructae. *Stylus* 7–9 mm. longus, versus basin biglandulosus; stigmate capitato.

Sebaea crassulaefolia, Cham. et Schlecht.; Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 50, in part. *Sebaea hymenosepala*, Gilg ex Schinz in Mitteil. Geogr. Ges. Lübeck, xvii., 1903, 49, in part.

Cape Colony. George Div.: near George, *Prior*! Albany Div.: mountains near Grahamstown, alt. 2000 ft., *Zeyher*, 205! *Cooper*, 25! *MacOwan*, 16! Signal Hill, near Grahamstown, *Schönland*, 16! Howisons Poort, *Schönland*! Bathurst Div.: Port Alfred, *Miss Sole*, 468!

This species has been separated out from *S. crassulaefolia*, Cham. et Schlecht., and *S. hymenosepala*, Gilg, and appears to be well marked. Under these two species a number of diverse forms have been placed at various times and an attempt has been made to sort these out into their proper species.

Sebaea (Pentandria) procumbens, *A. W. Hill* [Gentianaceae-Exaceae]; species distincta ex affinitate *S. repentis*, Schinz, et *S. Thodeanae*, Gilg; a *S. repente*, Schinz, caulibus erectis floriferis, cymis capitatis multifloris antheris triglandulosis filamentis brevissimis aliquanto in tubo corollae insertis; a *S. Thodeana*, Gilg, cymis confertioribus, floribus minoribus glandulis terminalibus antherae flavis praesertim differt.

Perennis, procumbens. *Caulis* 5–10 cm. longus, ramosus, repens, caulibus floriferis erectis 5–7 cm. altis. *Folia* opposita, nunc sparsa nunc congesta, spathulata vel orbiculari-spathulata, subpetiolata, ·8–1·4 cm. longa, 6–8 mm. lata, subcarnosa. *Flores* in cymas capitatas densas multifloras dispositi; rami circiter 4 mm. longi, pedicelli brevissimi, bracteis late vel anguste ovatis. *Calyx* 6 mm. longus, segmentis erectis infra paullo connatis ellipticis vel obovatis apiculatis membranaceis dorso crasse carinatis vel anguste alatis. *Corollae* tubus 6 mm. longus; lobi 6–8 mm. longi, 3·5–4 mm. lati, spathulati, subacuti. *Filamenta* brevissima in sinubus vel paullo infra corollae sinos inserta; antherae 1·75–2 mm. longae, apice uniglandulosae, glandulae 1 mm. longae, flavae, basi biglandulosae. *Stylus* 5 mm. longus, prope basin biglandulosus; stigmate capitato.

Orange River Colony. Summit of Mont aux Sources, alt. 9500 ft., *Flanagan*, 2079!

This species, evidently closely related to *Sebaea repens*, Schinz, appears, like *S. Schoenlandii*, Schinz, to be on the border between the sections *Eusebaea* and *Belmontia*. It forms together with *S. repens*, Schinz, *S. Thodeana*, Gilg, *S. Marlothii*, Gilg, and probably *S. spathulata*, Steud., a small and somewhat isolated natural group of creeping or rosette-forming plants, which occur in the Drakensberg region. *S. procumbens*, A. W. Hill, is distinguished from *S. repens* and *S. Marlothii* by the erect inflorescence-stalks and dense capitate cymes; in which respect it shows similarity to *S. Thodeana* and *S. spathulata*. As in

S. repens, the apical glands of the anthers are yellow, whilst *S. Marlothii*, *S. Thodeana* and *S. spathulata* are characterised by the possession of black glands at the apices of the anthers.

With regard to the insertion of the filaments of the anthers, in *S. repens* this takes place in the sinuses of the corolla, in *S. procumbens* either in or just below the sinuses, in *S. Marlothii*, and *S. Thodeana* just below the sinuses, whilst in *S. spathulata* the filaments are inserted more or less deeply in the corolla-tube. *S. Thodeana* and *S. spathulata* appear to be somewhat different from the three other species as regards the texture and colour of the corolla, and they also tend to form definite rosettes of elongate spathulate leaves, whilst the allied species are essentially creeping in habit. *S. spathulata* is further easily marked off from the others in the character of its style, the apex of which is always below the base of the anthers, and in this character it shows affinity with the peculiar and anomalous creeping species *S. Thomasii*, Schinz, which should probably be also included in this group.

Sebaea (Pentandria) spathulata, *Steud.* ex Griseb., in DC. Prodr., ix., 1845, 53 ; Schinz in Bull. Herb. Boiss., ser. II., vi., 1906, 732.

Belmontia spathulata, E. Mey., Comm., 1835, 183 ; Griseb. in DC. Prodr., ix., 55.

Belmontia Flanaganii, Schinz, in Bull. Herb. Boiss., iii., 1895, 413.

Sebaea Flanaganii, Schinz, in Bull. Herb. Boiss., ser. II., vi., 1906, 737.

Cape Colony. Aliwal North Div. : Witteberg Range, alt. 7500 ft., *Drège* !

Basutoland. Shady banks of Buffalo River, above the waterfall, alt. about 8100 ft., *Galpin*, 6778 ! summit of Mont aux Sources, alt. 9500 ft., *Flanagan*, 2080 ! Giant's Castle, alt. 6000 ft., *Guthrie* (*in Herb. Bolus*), 4881 ! Ruellenberg, *Flanagan*, 2080 !

I have no hesitation in referring *Sebaea Flanaganii* to *S. spathulata*, Steud., after having seen the type of the latter in Meyer's herbarium. The original specimen is in poor condition, and has lost the large black apical glands of the anthers, which are so characteristic of this species, but the scars are visible.

S. spathulata is somewhat variable in the size of its flowers and the depth to which the filaments of the anthers are inserted in the corolla-tube. It appears that *S. spathulata* possesses a short creeping stem, which bears rosettes of spathulate leaves.

S. spathulata is distinguished from all other Sebaeas, with the exception of *S. Thomasii*, Schinz, in having the apex of the stigma below the base of the stamens. The biglandular swelling also appears to be absent in both species. It is possible, however, that the functional stigma in these two species is morphologically the biglandular swelling almost universally found in other species of the genus, and that the style and stigma have not developed above the swelling. This point is at present under observation, but from the close similarity of *S. spathulata* to *S. Thodeana*, in which species the style and stigma with its swelling is quite typical

of *Sebaea*, it seems possible that the explanation offered above may be the true one. Both in *S. spathulata* and *S. Thodeana* the corolla is of a somewhat fleshy nature, and is of a texture unlike that usually met with in the genus.

Sebaea (Pentandria) Thomasii, *Schinz* [Gentianaceae-Exaceae] in Bull. Herb. Boiss., ser. II., iii., 1906, 743; descr. emend. et ampl., *A. W. Hill.*

Species distinctissima, nulli arcte affinis, habitu procumbens vel more *Gentianae* floribus conspicuis solitariis stylo breve insignis.

Perennis vel biennis, procumbens. *Caulis* ramosus, repens, aliquanto radicibus e nodis instructus, 12–22 cm. longus vel adscendens, 1–4 cm. altus. *Folia* opposita, numerosa, nunc sparsa, internodis ·6–1·2 cm. longis, nunc congesta, rosulata more *Gentianae vernae*, L., ovata vel orbiculari-ovata, ·8–1·4 cm. longa, 4 mm.–1·2 cm. lata, obtusa vel subacuta, paullo apiculata, coriacea, supra vernicosa. *Flores* plerumque solitarii terminales. *Calyx* 1·1–1·2 cm. longus, segmentis erectis elliptico-lanceolatis acuminatis crasse carinatis infra in tubum brevem connatis. *Corollae* tubus cylindricus, 1·2–2·2 cm. longus; lobi 1·0–1·3 cm. longi, 6–8 mm. lati, ovato-unguiculati, acuti. *Filamenta* 1 mm. longa, infra sinos corollæ 3–6 mm. inserta; antherae 2·5–3 mm. longae, apice glandula flava stipitata ·75–1·0 mm. longa, basi glandulis duabus minoribus instructae. *Stylus* circiter 4 mm. longus, stigmate clavato, 2–3·5 mm. longo; apice staminum insertionem haud attingente. *Capsula* ovoidea. *Semina* parva.

Parasia Thomasii, S. L. Moore in Journ. Bot., xxxix., 1901, 260, et in Journ. Bot., xlv., 1907, 154.

Cape Colony. Fort Beaufort Div.: top of the Winterberg Range, *Fraser*!

Orange River Colony. Mont aux Sources, in damp places, alt. 6500–10000 ft., *Flanagan* (*in Herb. Bolus*), 8215! *Bolus*, 10664, partly! without precise locality, *Pateshall Thomas*!

Natal. Tabamhlope, alt. 6000 ft., *Wylie* (*in Herb. Wood*), 10639! Giants Castle Pass, alt. 8–10000 ft., *Wylie* (*in Herb. Wood*) 10639! Giants Castle, alt. 8000 ft., *Guthrie* (*in Herb. Bolus*), 4882, partly!

This species is the most distinct member of the genus *Sebaea* and in general appearance hardly suggests that it should be placed in the genus. It is a very variable plant, with either long procumbent stems rooting at the nodes, or forming small rosettes very similar in appearance to plants of *Gentiana verna*, and in either case the shoots are terminated by a single flower (rarely two flowers). The flower, however, is similar to that of *S. spathulata*, Steud., both as regards the position of the anthers with their large apical glands, which are yellow, and in the style, the apex of which is situated at some distance below the base of the anthers. It seems possible that in this species the normal stigma characteristic of *Sebaea* is not properly developed. In spite, therefore, of its singular appearance the plant must be placed in the genus *Sebaea*. It may be considered to be the most peculiar of the interesting group of creeping and rosette-forming species which have been collected on the borders of Natal and the Orange River Colony.

As the species was originally described by Moore from a single specimen, which was not seen by Schinz, it has seemed advisable to give a fresh diagnosis of the species from an examination of a more complete series of specimens.

EXOCHAENIUM, *Griseb. in DC. Prodr.* ix., 1845, 55 ; *Schinz in Bull. Herb. Boiss.*, ser. II., vi., 1906, 744.

This genus is distinguished from *Sebaea* owing to the presence of a ring of disk-scales between the calyx and the corolla. The stamens are inserted in the corolla-tube. The style also does not possess the biglandular swelling typical of *Sebaea*, and the stigma is elongate-clavate.

The genus includes 11 species in Tropical Africa, with one species, *E. grande*, Griseb., in Natal, Orange River Colony and Transvaal.

Exochaenium was distinguished from *Belmontia*, E. Mey., by Grisebach, owing to the character found by him in the anthers :— "Antherae erectae, loculorum pariete interna inter se connatae, rima inde extrorsum aperta dehiscentes," v. Griseb., in DC. *Prodr.*, ix., 55 ; Benth. et Hook. *Gen. Plant.* ii., 804. As this observation was not confirmed either by Welwitsch or by Bentham and Hooker, the genus was not maintained in the *Genera Plantarum*. Grisebach's genus, as has been stated above, was made to receive the single species *Belmontia grandis*, E. Mey., a heterostyled plant. It seems clear that Grisebach must have examined only the long-styled flower, in which the anthers are concrescent and extrorse (v. fig. B, 4), and that both Welwitsch and Bentham and Hooker found only the short-styled flowers in which the anthers are always free (v. fig. A, 1). The genus *Exochaenium*, however, is not re-established in the *Flora Capensis* on such slender grounds, since the concrescent extrorse anthers appear to occur in only about two species of the genus.

The genus *Exochaenium* is subdivided by Schinz in *Bull. Herb. Boiss.*, vi., 1906, 745, into two sections *Euexochaenium* and *Pseudotachiadenus*. These divisions are useful, and, as I have included certain species not given by Schinz, and excluded one species from the genus, I append below a list of the species which I consider belong to *Exochaenium*.

Section **Euexochaenium**, Schinz.
E. grande, Griseb.
E. macranthum, A. W. Hill.
E. primulaeflorum, Welw.
E. zambesiacum, A. W. Hill.
E. debile, Welw.
E. platypterum, Schinz.
E. pumilum, A. W. Hill.

Section **Pseudotachiadenus**, Schinz.
E. chionanthum, Schinz.
E. Baumianum, Schinz.
E. gracile, Schinz.
E. Teuszii, Schinz.

Of these species, *E. grande*, *E. macranthum*, and *E. primulaeflorum* are dimorphic.

E. gracile and *E. grande*, var. *homostylum*, have stigma and anthers at the same level.

E. Baumianum has long-styled flowers, whilst in *E. debile*, *E. platypterum*, *E. pumilum*, *E. chionanthum*, and *E. Teuszii* the flowers have short styles. From the scanty material it is not possible to say whether any other species are dimorphic, though it seems highly probable that two forms of flower will be found in the larger flowered species.

Exochaenium Mechowianum, Schinz in Bull. Herb. Boiss., vi., 1906, 808, has been omitted from the list given above. This plant was described under the name of *Belmontia Mechowiana*, Vatke fide Schinz in *Vierteljahrschr. Naturf. Gesellsch.*, xxxvii., 333, and placed under *Exochaenium* in *Bull. Herb. Boiss.*, vi., 1906, 808. It is, I believe, a species of *Tachiadenus*, both on account of the absence of the disk-glands at the base of the calyx, and more especially of the character of its elongated style, equal in length to the corolla-tube, with its short bilobed stigma some distance above the anthers.

The assignment of this plant from Angola to the genus *Tachiadenus* is of some interest, since all the other species of the genus have been found in Madagascar.

Tachiadenus Mechowianus, *A. W. Hill.*

Belmontia Mechowiana, Vatke ex Schinz in Vierteljahrschr. Naturf. Gesellsch., Zürich, xxxvii., 1891, 333 ; Baker et Brown in Flor. Trop. Africa, iv., 1, 553.

Exochaenium Mechowianum, Schinz, in Bull. Herb. Boiss., ser. II., vi., 1906, 808.

BENGUELLA. Bank of Hamba, near Gambo, *Mechow*, 503 !

Exochaenium grande, *Griseb.* in DC. Prodr., ix., 1845, 55 ; Welw. in Trans. Linn. Soc., xxvii., 1869, 49 ; Schinz in Bull. Herb. Boiss., ser. II., vi., 1906, 745.

Belmontia grandis, E. Mey., Comm., 1837, 183 ; Schinz in Vierteljahrschr. Naturf. Gesellsch., Zürich, xxxvii., 330 ; Baker et Brown in Flor. Trop. Africa, iv., 1, 1904, 533, in part.

Sebaea grandis, Steud., Nom., ed. 2, 1841, 550.

Parasia grandis, Hiern. Cat. of Welw. Afr. Pl., part iii., 1898, 707 ; var. *major*, Moore in Journ. Bot., 1902, 384.

Exochaenium grande, Griseb., var. *major*, Schinz in Bull. Herb. Boiss., ser. II., vi., 1906, 802.

CAPE COLONY. Transkei : Tsomo, *Mrs. Barber*, 856 ! Tembuland : Bazeia, alt. 2000 ft., *Baur*, 155 ! Pondoland : between Umtentu River and Umzinkulu River, below 500 ft., *Drège* !

ORANGE RIVER COLONY. Thaba'Nchu, *Burke*, 205 ! *Miss Trollops* ! Free State Flats, *Mrs. Barber* ! near Harrismith, alt. 5500 ft., *Sankey*, 176 ! between Rhenoster River and Vaal River, *Mrs. Barber*, 626 ! and without precise locality, *Zeyher*, 1192 ! *Cooper*, 2758 !

BASUTOLAND. Damp localities by the Caledon River, *Mrs. Barber*, 20 ! *Hall* !

Transvaal. Boschveld, between Elands River and Klippan, *Rehmann*, 5061 ! Hoogeveld, near Donkers Hoek, alt. 4700 ft., *Rehmann*, 6534 ! *Schlechter*, 4137 ! Zuikerbosch Kop, Steenkamps Berg, *Nelson*, 390 ! near Lydenburg, *Wilms*, 969 ! Umdomati Valley, near Barberton, alt. 4000 ft., *Galpin*, 1291 ! Matsaba, in damp places, alt. 2000 ft., *Schlechter*, 4581 ! near Johannesburg, *Rand*, 1227 ! between Pretoria and Irene, *Burtt Davy*, 25 ! Belfast, *Burtt Davy*, 1290 ! Ermelo Experimental Farm, alt. 5400 ft., *Burtt Davy*, 7724 ! Liliefontein in Carolina District, *Nicholson* (*in Transvaal Herbarium*), 4309 ! and without precise locality, *McLea* (*in Herb. Bolus*), 5711 !

Natal. Coast-land, lat. 30° S., *Sutherland* ! between Attercliffe and Botha's Hill, alt. 600–1500 ft., *Sanderson*, 98 ! Noods Berg, alt. 2000 ft., *Wood*, 109 ! in grass-fields, &c., alt. 2000 ft., *Wood*, 247 ! near Tugela, *Gerrard*, 782 ! and without precise locality, *Sanderson*, 292 ! *Gerrard*, 253 ! *Cooper*, 2754 ! Zululand : Isandhlwana, *Patteshall Thomas* !

Lower Guinea. Angola : Huilla, near Lopollo, *Welwitsch*, 1516 !

Var. **homostylum**, *A. W. Hill*, formae typicae caulibus foliisque simili ; caulibus saepissime longioribus foliis minoribus superioribus saepius lineari-lanceolatis ad 1 cm. longis ; floribus saepisissime albidis rarius flavis ; segmentis calycis 1–1·6 cm. longis ; corollae tubo 1–1·4 cm. longo, lobis 5–8 mm. longis, 2–4 mm. latis, ovato-lanceolatis acutis ; antheris 1–1·5 mm. longis glandulis minoribus ; filamentis crassioribus supra basin tubi 6–7 mm. insertis, stylis 5 mm. longis, stigmate circiter 3 mm. longo inter antheras nidulante.

Belmontia natalensis, Schinz in Bull. Herb. Boiss., ii., 1894, 220.

Sebaea natalensis, Schinz in Bull. Herb. Boiss., ser. II., vi., 1906, 732.

Natal. Inanda, Eisbumbini, alt. 1800 ft., *Wood*, 133 ! Inanda, *Wood*, 541 ! Clairmont, near Durban, alt. 20 ft., *Wood*, 6100 ! near Durban, *Drège*, 4919 partly ! damp ground near Pinetown, alt. 800 ft., *Wood*, 657 ! Noodsberg, *Wood*, 922 ! moist pastures near Umzinto, *M'Ken*, 15 ! and without precise locality, *Sanderson*, without number ! and 292 partly ! Zululand : Ngoya, alt. 1000–2000 ft., *Wood*, 9322 !

Exochaenium grande is very variable in general appearance ; sometimes the plants are tall and slender, some 16 or more inches high, at others they are dwarf plants of not more than $2\frac{1}{2}$–3 inches in height. In the former case there is usually a branched inflorescence with some five or more flowers, whilst in the case of the smaller plants there may not be more than a single terminal flower. The flowers are large and striking, and as Schinz* has already shown, are heterostyled. In both the long- and short-styled flowers the filaments of the anthers are inserted about 6 mm. above the base of the corolla-tube. In the short-styled flowers the anthers are from 2–2·5 mm. long with a large conical stipitate gland 1·75–2 mm. long and two smaller basal glands ; the filaments are

* *Vierteljahrsch. Naturf. Gesellsch, Zürich*, xxxvii, 330 ; *Bull. Herb. Boiss.*, ser. II., vi., 1906, 746.

stout and from 5·5–6 mm. long. The style is only 3·75–4 mm. long with the papillate stigma forming 2·5–3 mm. of its length, and the top of the stigma does not reach beyond the base of the anther filaments.

The long-styled flowers show some interesting points of difference for the anthers which are rather smaller, being 1·75–2 mm. long and having smaller glands, are syngenesious, opening extrorsely, and form a ring round the base of the style. The style is 9 mm.–1 cm. long with a stigma 5 mm. long, and the stigmatic surface is well above the anther lobes.

A similar state of affairs is met with in *Exochaenium primulaeflorum*, Welw., which is also dimorphic, with the anthers syngenesious in the long-styled flowers (v. Figs. E. and F.). *E. macranthum*, A. W. Hill, however, differs from these two species in not having syngenesious anthers. The variety *homostylum*, A. W. Hill, of *E. grande* is of interest since in this form the stigma is on a level with the anthers, and the flowers are intermediate in character between the long- and short-styled forms. The flowers are smaller than in *E. grande* proper and the corolla is commonly white, but the plants do not appear to be specifically distinct from *E. grande*. This form has been described by Schinz in *Bull. Herb. Boiss.*, ii., 1894, 220, as *Belmontia natalensis*, and was transferred to *Sebaea* in *Bull. Herb. Boiss.*, vi., 1906, 732 (v. Figs. G., 16).

E. grande appears to be mainly a southern form, and all the tropical specimens, with the exception of Welwitsch's plant from Huilla, have been placed under *E. macranthum*.

Sebaea zambesiaca, Schinz, described by Baker as *Belmontia zambesiaca* in *Kew Bull.*, 1894, 25, is evidently a species of *Exochaenium* and closely allied to *E. macranthum*; from the small single specimen it is not possible to say whether it is a distinct species or not.

Exochaenium macranthum, *A. W. Hill* [Gentianaceae-Exaceae]; species ex affinitate *E. grandis*, Griseb., floribus minoribus, corollae lobis ovato-lanceolatis, antheris glandulisque minoribus antheris in floribus brevi-staminibus liberis differet.

Annua, erecta. *Caulis* simplex, 10–24 cm. altus, supra ramis axillaribus floriferis instructus. *Folia* per paria 3–6 decussatim disposita, inferiora minuta vel subulata, superiora 1·5–2·5 cm. longa, ·8–1·2 cm. lata, elliptico-ovata vel lanceolata, acuta. *Flores* solitarii vel in cymas laxas foliaceas pancifloras dispositi, heterostyli. *Calyx* ·9–1·4 cm. longus segmentis erectis lanceolatis acutis vel acuminatis alatis, alae 1–1·5 mm. latae versus basin latissimae. *Corollae* tubus 1·2–1·6 cm. longus, infra suburceolatus, supra infundibuliformis; lobi 7 mm.—1 cm. longi, 3–4·5 mm. lati, anguste ovato-lanceolati, acuti. *Filamenta* in tubo corollae 6–8 mm. supra basin inserta, in floribus brevi-staminibus circiter ·5 mm. longa, crassiora, in floribus longi-staminibus 3–3·5 mm. longa, crassa; antherae 1·25–1·75 mm. longae filamentis longis, majores 3-glandulae, apice glandulis ·5–·75 mm. longis. *Stylus* in floribus omnibus 4–6 mm. longus, in floribus longi-staminibus paullo brevior, stigmate 3·5–5 mm. longo, elongato-clavato, papilloso.

Belmontia grandis, Baker et Brown in Flor. Trop. Africa, iv. 1, 553, in part.

Exochaenium grande, Schinz in Bull. Herb. Boiss., ser. II., vi., 745, 802 in part.

Tropical Africa. Nile Land: Uganda; Ankole, *Doggett*! Buddu, alt. 4100 ft., *Brown*, 139! Mozambique Dist.: Portuguese East Africa; Medo country, between Lajenda River and Ibo, *Last*! Macequeci, 2000 ft., *Johnson*, 260! Nyasaland; Nyika Plateau at Mwanemba, alt. 8000 ft., *McClounie*, 98! at Mymkowa, 8000 ft., *McClounie*, 126! Angola: Longa River, 4000 ft., *Baum*, 640!

This species shows close external similarity to *E. grande*, Griseb., but appears to be a distinct form. The flowers are smaller, the petals especially being narrower and the anthers are never fused together as in the short-stamened flowers of *E. grande*. The anther-glands are smaller and orbicular-ovate, and the style is always shorter than in the long-styled flowers of that species. The flowers of *E. macranthum* are peculiar in that, although they are dimorphic, they are not properly heterostyled. In all the flowers examined the style is of about the same length—though in the flowers with long stamens it is usually somewhat shorter than in the short-stamened flowers—but the filaments of the anthers may be either short, about ·5 mm. long, or long, about 3–3·5 mm. long. The result in these cases is that in the flowers with short stamens, the stamens are on a level with the lower part of the stigma, whilst in the flowers with long stamens the stamens are above the top of the stigma. This condition of affairs is quite different from *E. grande* and *E. primulaeflorum*, where the flowers are properly heterostyled, and long and short styles are found in correspondence with the long or short stamens (v. Figs. C. and D.).

In *E. macranthum* the filaments of the stamens are always found to be inserted at from 6–8 mm. from the base of the corolla-tube in either condition of the flower, and it is the length of the filaments which determines the position of the anthers. The filaments are always stout. The stout filaments and the free anthers in the short-stamened flowers of this species are in marked contrast to the condition of affairs in the long-styled flowers of *E. grande* and *E. primulaeflorum* (v. Figs. E. and F.). In these two species the anthers in the long-styled flowers are syngenesious and open extrorsely and the filaments are very delicate (cf. Figs. 3, 4, 13 and 14). The flowers of *E. macranthum* approach most nearly those of the var. *homostylum*, A. W. Hill, of *E. grande*.

A. W. Hill.

Explanation of Plate.

A. *Exochaenium grande*, short-styled flower.
1. Flower showing anthers with stout filaments and glands and the short style × 1½.
2. Stamen showing glands and mode of dehiscence.

B. *E. grande*, long-styled flower.
3. Flower showing the syngenesious anthers and the long style × 1½.

4. The fused anthers with their glands seen from inside, the anthers open extrorsely.
5. The anthers partly in section, more highly magnified, showing the mode of fusion and the extrorse dehiscence.

C. *E. macranthum*, flower with long stamens.
6. Flower showing the long stamens, with relatively small anther-glands × 1½.
7. Stamen, back view, showing the attachment of the filament.
8. Stamen, front view, showing the introrse dehiscence of the anther.

D. *E. macranthum*, flower with short stamens.
9. The short stamens are free, have stout filaments, and the anthers open introrsely × 1½.
10. An anther showing introrse dehiscence.

E. and F. *E. primulaeflorum*.
11. A short-styled flower × 1½.
12. A single stamen, showing the mode of attachment of the filament and the elongated apical anther-gland.
13. The anthers of the long-styled flower, showing the lateral fusion × 2.
14. As fig. 13 × 6, the anthers are syngenesious and open extrorsely, the filaments are very short and the anther-glands are elongated.
15. The style and ovary of the long-styled flower.

G. *E. grande*, var. *homostylum*.
16. The flower showing the anthers on a level with the stigma × 1½.
17. A back view of an anther.
18. Anther, front view showing dehiscence.

XLV.—NOTES ON CHIRONIA AND ORPHIUM.

Some divergence of view has obtained as to the limitation of the Gentianaceous genera *Chironia*, Linn., and *Orphium*, E. Mey. As to *Chironia*, authors are not always in harmony in their descriptions of certain species; sometimes, even when the descriptions agree, the citations are not in accord.

While the delimitation of the species is, as a rule, easy, bibliographical difficulties occasionally leave the incidence of particular names so uncertain that it has been necessary to ascertain the identity of the actual specimens, when these exist, that have been made use of by different authors.

The material studied in attaining this end has included, in addition to the specimens in the Kew Herbarium, those preserved in the following collections:—Berlin (including Herb. Willdenow); Dr. Bolus; British Museum (including Herb. Sloane); Brussels; Cambridge; Mr. De Candolle; Dublin (including Herb. Harvey); Edinburgh; Geneva (Herb. Delessert); Goettingen; Leiden; Linnean Society (Herb. Linnaeus); Lübeck; Oxford; Paris (including Herb. Lamarck); Stockholm (including Herb. P. J. Bergius); Transvaal (Dept. Agric. Herb.); Upsala (including Herb. Thunberg); Vienna (Hof-Museum); Zürich. The warm thanks of Kew are due to the keepers and owners of these public and private collections for the readiness with which help has been accorded.

The results of this study, as regards bibliography and distribution, will be found briefly stated in the concluding part of Sir W. T. Thiselton-Dyer's *Flora Capensis*, vol. iv., sect. 1. Exigencies of space forbid a full statement there of the evidence on which these

results are based. This evidence is given here, and in its presentation the limitation and subdivision of the genera and the incidence of the names applied to their species are separately considered. As bearing equally upon, and as linking these two distinct questions, a conspectus of the *Chironiineae*, to which both genera belong, is intercalated, while the notes conclude with a statement of the synonymy of the African plants that have been referred to *Chironia*. For the synonymy of such extra-African species as have been placed in that genus reference may be made to the *Index Kewensis*.

Chironia, Linn., as established in 1737, was not a natural genus; four of the seven species enumerated by Linnaeus in 1753 (*Sp. Pl.*, pp. 189, 190) belong to *Exacum* or to *Sabbatia*. Lamarck, Persoon, and Willdenow were equally undetermined. The last-named writer in 1797 enumerated sixteen species, of which nine belong to *Exacum*, *Sabbatia*, or *Erythraea*. Its confusion with these alien genera was ended in 1810 when R. Brown, in a passing note (*Prodr. Fl. Nov. Holl.*, i., p. 451), first placed *Chironia* on a sound footing.

Brown was not the earliest author to realize the unsatisfactory nature of *Chironia* as established by Linnaeus. Necker in 1790 (*Elem.*, ii., p. 32) proposed a genus *Valerandia* to include some of the Linnean species, and in dealing with what he considered *Chironia* proper, Necker further (*ibid.* p. 33) excluded from the genus the only species that has a berry-like fruit. Necker looked on this species, *C. baccifera*, Linn., as entitled to generic rank, but suggested no generic name; this was done by Moench in 1802 (*Meth. Suppl.*, p. 212), when he termed it *Roeslinia*. This treatment of *C. baccifera* is probably defensible; it has, however, rarely been adopted, and although the status of a section accorded to *Roeslinia* by Endlicher in 1838 (*Gen. Pl.*, p. 601) is inadequate, the case is perhaps, for the moment, sufficiently met by the recognition of *Roeslinia* as a sub-genus of *Chironia*.

Brown, besides being the first to establish *Chironia* as a natural genus, was the first to suggest its further subdivision; five of his seven species were treated as § *Legitimae*; the other two, *C. baccifera* (*Roeslinia*, Moench) and *C. frutescens* (now *Orphium*, E. Mey.), were termed § *Dubiae*. Chamisso in 1831 (*Linnaea*, vi., pp. 343, 344) followed Brown, for § *Verae*, Cham., and § *Legitimae*, R. Br., are the same thing, as are also § *Spuriae*, Cham., and § *Dubiae*, R. Br. But, in defining his sections, Chamisso has stated that § *Spuriae* are species with berry-like fruits, a statement that is only correct as regards *C. baccifera*, not as regards *C. frutescens*, where the fruit is a capsule. Copying this treatment, G. Don in 1837 (*Gen. Syst. Gard.*, iv., p. 203), placed *C. frutescens* and its variety *augustifolia*, along with *C. baccifera*, in the genus *Roeslinia*. The error was corrected by Grisebach (*Gen. & Sp. Gent.*, p. 97) in 1839.

E. Meyer in 1837 (*Comm. Pl. Afr. Austr.*, ii., pp. 177–182) dealing with the South African material collected by Drège, broke up *Chironia*, as limited by Brown, into three genera :—(1) *Chironia*, in which he still retained *C. baccifera* (*Roeslinia*, Moench), one of the *Dubiae* of Brown or *Spuriae* of Chamisso. *C. frutescens*, the other member of the *Dubiae*, or *Spuriae*, was made the type

of (2) *Orphium*, E. Mey., distinguished from *Chironia* by having a crenate disk between the calyx and the corolla and having twisted anthers. The last genus, (3) *Plocandra*, was based on two species which agree with *Chironia* as regards absence of disk and with *Orphium* as regards twisting of anthers. *Plocandra*, E. Mey., has not stood the test of further investigation; it had to be relegated by Bentham and Hooker to *Chironia* (*Gen. Pl.*, ii., p. 805) in 1876. *Orphium*, E. Mey., was similarly replaced in *Chironia* by Kuntze in 1891 (*Rev. Gen.* p. 432); in this case, however, the necessity for reduction is less evident, and as *Orphium* has been maintained on different grounds both by Bentham and Hooker (*Gen. Pl.*) and by Gilg (*Engl. & Prantl Nat. Pflanzenf.*) we may with some safety accept it as entitled to generic rank. But it must not be concluded that on this account Kuntze's proposal has no justification; it is by no means clear that the characters relied upon in separating *Orphium*, E. Mey., from *Chironia* are more important than those which distinguish *Roeslinia*, Moench, from *Chironia*.

The genus *Chironia*, as limited by Meyer, was divided by him into three sections :—§ 1, with oblong capsule and narrowed corolla-throat; § 2, with oblong capsule and uncontracted corolla-throat; § 3, with globose berry-like fruit and narrowed corolla-throat. The third of these sections includes only *C. baccifera*, and therefore is equivalent to *Roeslinia*, Moench. In 1836, however, Rafinesque (*Fl. Tell.*, iii., p. 29) had already based on a species belonging to § 1 his genus *Eupodia*, and on a species belonging to § 2 another genus *Evalthe* (*ibid.* p. 77). Rafinesque's genera are, however, less distinct than Moench's genus *Roeslinia*, and the groups to which their types belong are certainly not entitled to more than sectional rank.

The definitions given by Meyer of the genera *Chironia*, *Orphium* and *Plocandra* were taken up in the following year by Endlicher (*Gen. Pl.*, pp. 601, 602). In the case of *Chironia* Endlicher adopted Meyer's sections, naming the first *Hippochiron*, the second *Euchironia*, the last *Roeslinia*, adopting in this case Moench's generic name for the one species it contains. There is a slight inaccuracy in Endlicher's citation of types, for Lamarck's plate (*Ill. Gen.*, t. 108, fig. 2) quoted under *Euchironia*, represents a *Hippochiron*. We learn from Endlicher that when he published these sectional names the monograph of the *Gentianaceae* on which Grisebach was engaged had not yet been issued.

When, in 1839, Grisebach's monograph (*Gen. & Sp. Gent.*) did appear, it showed that he had not had access, in preparing it, to Meyer's work of 1837, or to that of Endlicher. Grisebach relegated to *Chironia* the genus *Valerandia*, Neck., but did not associate it with any particular species. He still retained *C. frutescens* in the genus, but treated it as the type of a distinct section, (1) *Trachanthera*. A species, *C. Krebsii*, nearly allied to one of those included by Meyer in *Plocandra*, was treated as the type of another section, (2) *Pseudosabbatia*. Grisebach recognised a third section, (3) *Silenophyllum*, which is the same as *Hippochiron*, Endl. His remaining sections are (4) *Viscaria* and (5) *Linophyllum*, which together correspond to *Euchironia*, Endl.; and, finally, (6) *Roeslinia*, which corresponds in intention

to Moench's genus and Endlicher's section so named. But the limits of *Roeslinia*, Griseb., are less natural than those of *Roeslinia*, Endl., for it includes, along with *C. baccifera*, a species, *C. serpyllifolia*, Lehm., which Grisebach has accurately described as having a capsular, not a berry-like fruit. Meyer had already correctly referred this plant to the section *Hippochiron*, under the name *C. parvifolia*.

In 1845 Grisebach (*DC. Prodr.* ix., p. 39–44) modified his previous treatment by recognising *Orphium*, E. Mey., which corresponds to the section *Trachanthera*, Griseb., and *Plocandra*, E. Mey., which includes *Pseudosabbatia*, Griseb. The limitation of the remaining sections remained unchanged, but the name *Silenophyllum* was abandoned in favour of *Hippochiron*, Endl., and the names *Viscaria* and *Linophyllum* were altered to *Ixochiron*, Griseb., and *Linochiron*, Griseb., respectively. To the former he added *C. arenaria*, E. Mey., which is really a *Linochiron*. Grisebach, moreover, still retained in *Roeslinia*, Endl., the species *C. serpyllifolia*, Lehm., which is a *Hippochiron*.

Valerandia, Neck., which Grisebach in 1839 had included in *Chironia*, was in 1845 doubtfully referred by him to *Orphium*, a proposal at variance with that made by Endlicher in 1840 (*Gen. Pl. Suppl.*, p. 1399) when he, while recognising *Orphium* as distinct from *Chironia*, nevertheless referred *Valerandia* to the latter genus.

In 1876 Bentham and Hooker (*Gen. Pl.* ii., p. 805) pointed out that *Plocandra*, E. Mey., is not a distinct genus, and that *Roeslinia*, Moench, which most authors have retained in *Chironia*, is more entitled to separate consideration than *Plocandra*. No sectional subdivision of *Chironia* was suggested. *Orphium*, E. Mey., was accepted by Bentham and Hooker as a distinct genus, but as Knoblauch has shewn, the differential characters advanced, though accurate, are hardly adequate. The most distinctive character, not mentioned by Bentham and Hooker, is the presence of a prominent disk between the calyx and corolla in *Orphium*, whereas *Chironia* has no such disk. *Valerandia*, Neck., and its reference to *Orphium*, were alluded to, but no definite decision was advanced as regards the divergent views held by Grisebach and Endlicher.

In 1877 Oliver (*Hook. Ic. Pl.*, t. 1229) proposed a section *Xanthochiron* under *Chironia* for a new species, *C. exigua*, Oliv. This plant is, however, a *Sebaea*, so that the section *Xanthochiron* disappears.

In 1895 Gilg (*Eng. Nat. Pflanzenf.*, iv., 2, pp. 76–78) has again recognised *Orphium*, E. Mey., as a genus apart from *Chironia*, and has followed Bentham and Hooker in reducing *Plocandra*, E. Mey., to *Chironia*.

In the genus *Chironia* Gilg has recognised the four sections adopted by Grisebach in 1845, viz. :—*Hippochiron*, Endl.; *Ixochiron*, Griseb. ; *Linochiron*, Griseb., and *Roeslinia*, Endl. *Ixochiron* and *Linochiron* are delimited as they were by Grisebach. But *Hippochiron*, Gilg, is different from *Hippochiron* as understood by Meyer, Endlicher and Grisebach, since it not only includes the species that belong to the section, but those that belong to the equally natural section *Pseudosabbatia*, Griseb., and in addition

those species referable to the genus *Plocandra* as understood by Meyer that do not conform in character with the definition of *Pseudosabbatia*. At the same time *Roeslinia*, Gilg, is more unlike the natural group *Roeslinia*, Endl., which corresponds to Moench's original genus so named, than the composite section *Roeslinia*, Griseb. Gilg, following Grisebach, has retained in *Roeslinia* the species *C. serpyllifolia*, which is a *Hippochiron*; he has further admitted to the section a species from Madagascar which belongs to another subgenus. Inadvertently Gilg has attributed to all the species included in the section a berry-like fruit. This is not the case as regards *C. serpyllifolia*, the fruit of which is a capsule, as Grisebach has described it. Adopting an accidental modification in its orthography used by Bentham and Hooker, Gilg has followed Grisebach in doubtfully reducing *Valerandia*, Neck., to *Orphium*, E. Mey.

Valerandia was proposed by Necker (*Elem.*, ii., p. 33), to include some of the species of *Chironia*, Linn. The diagnostic character of the genus is the existence in the flower of a ring of crenate scales. These scales, according to the sequence of characters in the definition, lie within the corolla. The one reliable diagnostic character of *Orphium*, E. Mey., is the existence of a crenate disk, not met with in *Chironia*. This disk lies outside the corolla. Therefore the existence of this disk, so far from suggesting that *Orphium*, E. Mey., may be the same as *Valerandia*, Neck., shows that *Valerandia* cannot be *Orphium*. The evidence to this effect does not end here. Necker has given a definition of *Chironia* (*Elem.*, ii., p. 34), as limited by him after (*a*) the segregation of whatever Linnean species he had placed in *Valerandia*, and (*b*) the exclusion of *C. baccifera* (*Roeslinia*, Moench). The diagnostic character of this restricted genus *Chironia*, Neck., is that the anthers are spirally twisted. Therefore *Chironia*, Neck., does not include any true *Chironia* enumerated by Linneaus, but is restricted to the three Linnean *Chironiae* which belong to the genus *Sabbatia*, Adans., and to *C. frutescens* which is *Orphium*, E. Mey. *Valerandia* then, as described by Necker, cannot be *Orphium*, E. Mey.; *Chironia*, Neck., after the segregation of *Valerandia*, still included *C. frutescens*, Linn., the plant on which *Orphium*, E. Mey., is based.

The effect of Necker's diagnosis of *Chironia* is reflected in the description by Gaertner in 1791 (*Fruct.*, ii., p. 156), in which stress is laid on the character of twisted anthers. We know that *Chironia*, Gaertn., was less circumscribed than *Chironia*, Neck., for Gaertner included and partially figured the species *C. baccifera* which Necker had expressly excluded. The character of twisted anthers, as used by Necker, was probably quite diagnostic; as employed by Gaertner, it is not so, for the anthers of *C. baccifera* are straight.

The suggestion of Endlicher, made in 1840, that *Valerandia*, Neck., is *Chironia*, Linn., is as untenable as that made by Grisebach in 1845. There is no ring of crenate scales within the corolla of any of the species belonging to the genus *Chironia* as limited by Endlicher himself in 1838. What *Valerandia*, Neck., may be does not concern the present enquiry; it is sufficient here to show that *Valerandia*, Neck., cannot be *Orphium*, and cannot be *Chironia*.

Schoch, in monographing the genus *Chironia* (*Bot. Centralbl. Beih.*, xiv. pp. 177–242) in 1903, has not recognised the sections adopted by Gilg. He has not attempted to group the species, but has arranged them in a sequence based on the exigencies of an artificial key.

As might be expected in a genus where, as in *Chironia*, some of the forms are so nearly allied that they have been accorded now specific now only varietal rank, this arrangement is not always satisfactory. Considering in the first place those discrepancies which amount only to differences of opinion, it is found that the sequence adopted by Schoch occasionally divorces what are manifestly closely allied forms. Thus, *C. nudicaulis* (n. 8 of Schoch) and *C. lychnoides* (his n. 14) are both varieties of *C. jasminoides*, Linn.; *C. mediocris* (n. 12 of Schoch) is a variety of *C. arenaria* (his n. 17); *C. melampyrifolia* (n. 13 of Schoch) and *C. Schlechteri* (his n. 18) both belong to *C. laxa*, Gilg; *C. maxima* (n. 24 of Schoch) is identical with *C. rosacea* (his n. 32); *C. laxiflora* (n. 27 of Schoch) is the same as *C. rubro-coerulea* (his n. 29). In addition, however, we find that the artificial arrangement adopted by Schoch deviates unnecessarily from a natural sequence owing to certain inadvertencies. Thus, the fruit of *C. serpyllifolia* is stated to be berry-like, whereas it is, as Grisebach originally described it, a capsule; the leaves of *C. madagascariensis* are described by Schoch as glabrous, whereas they are, in the original specimens, pubescent; the whole plant in the case of *C. lancifolia* is said to be glabrous, whereas the stems, the leaf-veins, and the leaf-margins are scabridulous-hispid.

The species referred to *Chironia*, Linn., in the restricted sense proposed by Bentham and Hooker and adopted by Gilg and by Schoch, arrange themselves in three natural groups of apparently equal rank, but of very unequal size. The first of these, (1) *Roeslinia*, corresponds to the genus so named by Moench, and includes only one species, *C. baccifera*, rather variable in appearance, and fairly widely spread in South Africa. The group is characterised by having glabrous leaves and stems, and globular baccate fruits, which readily drop off, leaving behind the persistent calyx. The next group, (2) *Euchironia*, includes all the species from the African continent so far known, except *C. baccifera*. This group is characterised by having glabrous leaves and stems, though in one species, *C. Bansei*, the pedicels and calyx-tubes are faintly puberulous; the fruits are oblong not globose, and capsular not baccate. The two valves of the capsule are leathery, and remain, like the calyx, permanently attached to the torus; the valves moreover continue partially connate at the base, often also at the apex. The remaining group, (3) *Neochironia*, includes two species, *C. madagascariensis* (with a variety *pubescens*) and *C. lancifolia*, both confined to Madagascar. This group is characterised by having scabridulous-hispid or softly pubescent leaves and stems, and, where the fruit is known, by having ovoid capsules, the two valves of which are crustaceous when ripe, become completely separated from each other, and are ultimately detached from the torus, leaving behind only the persistent calyx. These three groups may be conveniently considered subgenera.

The central subgenus, *Euchironia*, calls for further subdivision. It has to be noted that this subgenus, *Euchironia*, is wider in its limits than the section *Euchironia*, Endl. Endlicher's *Euchironia* included only the sections *Linochiron*, Griseb., and *Ixochiron*, Griseb. The *Euchironia* here recognised includes, along with these, the section *Hippochiron*, Endl., and the genus *Plocandra*, E. Mey. The species within it arrange themselves naturally in six subordinate groups, which may be conveniently treated as sections. These sections are :—

1. *Linochiron*, Griseb., with six species ; *C. arenaria*, *Schinzii*, *emarginata*, *gracilis*, *Zeyheri*, *linoides*.

2. *Heterochiron*, with a single species : *C. Bansei*.

3. *Pseudosabbatia*, Griseb., with five species : *C. rosacea*, *transvaalensis*, *flexuosa*, *palustris*, *Krebsii*. The species last mentioned is the one on which Grisebach originally based this section.

4. *Plocandra*, with seven species : *C. humilis*, *erythraeodes*, *Baumiana*, *purpurascens*, *angolensis*, *Verdickii*, *laxiflora*. This section does not correspond in its entirety to the genus *Plocandra*, E. Mey., from which its name is taken ; it includes only those species referable to *Plocandra*, as that genus was defined by Meyer, which do not belong to *Pseudosabbatia*, Griseb.

5. *Hippochiron*, Endl., with seven species : *C. Peglerae*, *pedunculariis*, *jasminoides*, *serpyllifolia*, *laxa*, *floribunda*, *maritima*.

6. *Ixochiron*, Griseb., with four species : *C. scabrida*, *tabularis*, *tetragona*, *melampyrifolia*.

Though tolerably well defined, the limits of these sections are less cleanly cut than those of the three higher groups. *C. maritima*, in *Hippochiron*, serves to connect that section with *Ixochiron ; C. Schinzii*, in *Linochiron*, links that section with *Ixochiron ; C. Peglerae*, in *Hippochiron*, serves to connect that section with *Plocandra*, while *C. Verdickii*, in *Plocandra*, links that section with *Hippochiron ; C. humilis*, in *Plocandra*, serves to connect that section with *Pseudosabbatia* ; finally *C. Bansei*, in *Heterochiron*, has characters in common with *Linochiron*, with *Hippochiron*, with *Pseudosabbatia* and, as regards its faint pubescence, even with the genus *Orphium*.

The limits of these natural groups have been obtained from a consideration of the sum of their common characters. It is interesting, therefore, to find that what appears to be the most natural grouping attainable traverses the evidence afforded by one particular character which impressed so able a worker as E. Meyer as being of generic value. It was largely owing to the fact that in certain species of *Chironia* the anthers become spirally twisted, as they do in the allied genus *Orphium*, that Meyer was led to propose his genus *Plocandra*. The character is certainly well marked in most of the species that compose the section *Plocandra*, as here limited. But even in this group there is one species, *C. Verdickii*, in which the anthers are almost straight. In the section *Pseudosabbatia*, however, one species of which was originally included by Meyer in the genus *Plocandra*, only two of the five species have very markedly spiral anthers. On the

other hand, in the section *Hippochiron*, where the anthers are usually straight, one species, *C. Peglerae*, in other respects a *Hippochiron*, has the anthers quite as twisted as in a normal *Plocandra*. Bentham and Hooker have indeed remarked that the anthers may at times be spiral in *C. peduncularis*. This does not appear to be the case in any specimen of *C. peduncularis* in Herb. Kew. It is, however, found from their specimens that *C. peduncularis*, Benth. and Hook. f. (*Gen. Pl.*, ii., p. 805), was not exactly Lindley's species so named, but included *C. rosacea*, Gilg, which is a *Pseudosabbatia*, and has somewhat twisted anthers. The true *C. peduncularis*, Lindl., was in part treated by Bentham and Hooker as a distinct species, *C. latifolia*, E. Mey.

In the subjoined conspectus of the *Chironiinae*, Gilg (*Engl. Nat. Pflanzenf.*, iv. 2, p. 76), which subdivision is confined to the genera *Orphium* and *Chironia*, the diagnostic characters of these genera and of the subordinate groups of species that compose the latter are given in detail; the characters that distinguish the varieties recognisable under certain of the species are shown in smaller type.

CHIRONIINAE

(Gilg in Engl. Nat. Pflanzenfam., iv., 2, 76).

Genus A.—**ORPHIUM.** *Calyx-lobes* obtuse, without keels. Crenulate *disk* between calyx and corolla. *Leaves* and *stems* usually pubescent.

A single species—S. Africa. *O. frutescens.*

Leaves flat ... ... *α. frutescens, typica.*
Leaves semiterete ... ... *β.* var. *angustifolia.*

Genus B.—**CHIRONIA.** *Calyx-lobes* usually acute and usually keeled. No *disk* between calyx and corolla.

Subgenus I.—ROESLINIA. *Fruit* indehiscent, baccate, fleshy, readily separating entire from the torus; *leaves* and *stems* glabrous.

Section 1.—**Roeslinia.** *Calyx* 5-partite; *corolla-tube* cylindric, narrowed under limb; *anthers* straight; *ovary* obtuse, globose.

A single species—S. Africa. 1. *C. baccifera.*

Leaves linear; corolla-lobes not exceeding ¼ in. *α. baccifera, typica.*
Leaves narrow-linear; corolla-lobes exceeding ⅓ in. ... ... *β.* var. *grandiflora.*
Leaves narrow-oblong; corolla-lobes not exceeding ¼ in. ... ... *γ.* var. *Burchelli.*
Leaves subspathulate-oblong; corolla-lobes not exceeding ¼ in. ... ... *δ.* var. *dilatata.*

Subgenus II.—EUCHIRONIA. *Fruit* a 2-valved capsule, coriaceous, the valves usually not quite separated to the base, and remaining attached to the torus after the seeds are shed; *leaves* and *stems* glabrous.

Section 2.—**Linochiron.** *Calyx* 5-fid, rarely 5-partite; *corolla-tube* narrow-campanulate; *anthers* straight or faintly spiral; *ovary* obtuse, ovoid or oblong.

Stems diffuse; branches patent; calyx-lobes broad spreading:—
Calyx 5-partite, longer than corolla-tube; corolla-lobes obovate or suborbicular—S. Africa. 2. *C. arenaria.*

Leaves linear to lanceolate; corolla-lobes apiculate ... ... *a. arenaria, typica.*
Leaves narrow-oblong; corolla-lobes obtuse or retuse ... ... *β.* var. *mediocris.*

Calyx 5-fid, not longer than corolla-tube; corolla-lobes elliptic-lanceolate—S. Africa. 3. *C. Schinzii.*

Stems erect; branches erect or ascending; calyx 5-fid:—
Calyx longer than corolla-tube, with thick margins:—
Leaves narrow-linear or subulate:—
Calyx-lobes wide-triangular, obtuse or acute, erect overlapping and subauriculate at base—S. Africa. 4. *C. emarginata.*

Calyx-lobes narrow, acute or subobtuse, often slightly spreading, not subauriculate at base—S. Africa. 5. *C. gracilis.*

Calyx under ½ in. long, lobes lanceolate or narrow-oblong; leaves under 1 lin. wide *a. gracilis, typica.*
Calyx ½ in. long, lobes wide-triangular; leaves 1 lin. wide or wider ... ... *β.* var. *macrocalyx.*

Leaves narrow-spathulate; calyx-lobes rounded at apex, erect, not subauriculate—S. Africa. 6. *C. Zeyheri.*

Leaves ¼ in. wide ... ... *a. Zeyheri, typica.*
Leaves ⅛ in. wide ... ... *β.* var. *angustifolia.*

Calyx not longer than corolla-tube, lobes triangular with thin pale margins, acute, erect, not subauriculate at base; leaves linear—S. Africa. 7. *C. linoides.*

Section 3.—Heterochiron. *Calyx* 5-partite; *corolla-tube* cylindric; *anthers* faintly spiral; *ovary* subacute, ovoid; *pedicels* and *calyx-tube* externally faintly puberulous.

A single species—only known in cultivation. 8. *C. Bansei.*

Section 4.—Pseudosabbatia. *Calyx* 5-fid; *corolla-tube* cylindric; *anthers* from faintly to distinctly spiral; *ovary* acute, ovoid.

Stem-leaves in 4–8 pairs; radical leaves few, usually soon vanishing; panicles lax; anthers faintly spiral:—
Stem-leaves broad, over ½ in., ovate-lanceolate; corolla-lobes usually ovate, obtuse—S. Africa. 9. *C. rosacea.*

Stem-leaves narrow, under ½ in., lanceolate or linear:—
Calyx-lobes longer than tube; buds before opening over ½ in. long—Trop. Africa; S. Africa. 10. *C. transvaalensis.*

Calyx-lobes not longer than tube; buds before opening under ⅓ in. long—Trop. Africa. 11. *C. flexuosa.*

Stem-leaves in 1–2, rarely 3 pairs; radical leaves many, subrosulate, persisting; anthers distinctly spiral:—
Panicles lax, their branches spreading—S. Africa. 12. *C. palustris.*

Radical leaves obovate-spathulate ... ... *a. palustris, typica.*
Radical leaves oblanceolate ... ... *β.* var. *foliata.*

Panicles dense, their branches virgate; radical leaves oblanceolate—S. Africa. 13. *C. Krebsii.*

Section 5.—**Plocandra.** *Calyx* 5-sect; *corolla-tube* very short, limb large, campanulate; *anthers* usually distinctly spirally twisted; *ovary* acute, ovoid.

Radical leaves subrosulate, persisting; panicle-branches erect or ascending :—

Stem-leaves nearly or quite as long as internodes; primary peduncles short, never over $\frac{1}{3}$ in. long, usually much shorter; leaves linear—Trop. Africa; S. Africa. 14. *C. humilis.*

Stems simple; radical leaves lanceolate ... *α. humilis, typica.*
Stems more robust, often branched upwards; radical leaves narrow-obovate ... ... *β.* var. *Wilmsii.*

Stem-leaves shorter than internodes; primary peduncles never under $\frac{1}{2}$ in. long :—

Stem-leaves oblong or lanceolate, semi-amplexicaul—Trop. Africa. 15. *C. erythraeodes.*

Stem-leaves lanceolate or linear, base cuneate—Trop. Africa. 16. *C. Baumiana.*

Radical leaves vanishing; primary peduncles never under $\frac{1}{2}$ in. long :—

Panicle-branches erect or ascending—S. Africa. 17. *C. purpurascens.*

Leaves obovate to lanceolate; flowers 1 in. across, all 5-merous ... ... *α. purpurascens, typica.*
Leaves larger, oblong; flowers 1 in. across, on secondary branches sometimes 4-merous ... *β.* var. *Tysonii.*
Flowers larger, 1½ in. across ... ... *γ.* var. *impedita.*

Panicle-branches spreading :—

Stem-leaves usually nearly or quite as long as internodes, ovate-lanceolate or lanceolate, base cuneate :—

Anthers distinctly spirally twisted—Trop. Africa. 18. *C. angolensis.*

Anthers little twisted, markedly sagittate at base—Trop. Africa. 19. *C. Verdickii.*

Stem-leaves much shorter than internodes, wide-ovate, base rounded or cordate—Trop. Africa. 20. *C. laxiflora.*

Section 6.—**Hippochiron.** *Calyx* 5-sect; *corolla-tube* cylindric, narrowed under limb; *anthers* straight or rarely distinctly spirally twisted; *ovary* acute, ovoid.

Leaf-bases rounded or cordate :—

Stems erect, strongly angular; branches ascending; calyx longer than the corolla-tube; anthers distinctly spiral—S. Africa. 21. *C. Peglerae.*

Stems decumbent, terete; branches spreading; calyx not longer than corolla-tube; anthers straight—S. Africa. 22. *C. peduncularis.*

Leaf-bases cuneate; anthers straight :—

Stems erect, leaf-margins smooth :—

Stems simple or sparingly virgately branched above; leaves and flowers large—S. Africa. 23. *C. jasminoides.*

Stems remotely leafy, leaves ovate-lanceolate to lanceolate ... ... *α. jasminoides, typica.*
Stems remotely leafy, leaves linear ... *β.* var. *viminea.*
Stems rather closely leafy throughout, leaves ovate-lanceolate ... ... *γ.* var. *multiflora.*
Stems rather closely leafy only below, leaves ovate to ovate-lanceolate ... *δ.* var. *tabularis.*

Stems much diffusely branched, leaves and flowers rather small :—

Leaves about $\frac{1}{3}$ in. long, not more than twice as long as broad—S. Africa. 24. *C. serpyllifolia.*

Corolla-lobes ovate-lanceolate, subacuminate; leaves ovate ... ... *α.* var. *serpyllifolia, typica.*
Corolla-lobes lanceolate, acuminate; leaves narrow-ovate, $\frac{1}{3}$ in. long ... *β.* var. *laxa.*
Corolla-lobes lanceolate, acuminate; leaves narrow-ovate, $\frac{1}{5}$ in. long ... *γ.* var. *microphylla.*

Leaves $\frac{3}{4}$ in. long or longer, at least four times as long as broad :—

Corolla-lobes acute—S. Africa. 25. *C. laxa.*

Corolla-lobes obtuse—only known in cultivation. 26. *C. floribunda.*

Stems below decumbent and rooting at the nodes; leaf-margins very minutely scabridulous; corolla lobes acute—S. Africa. 27. *C. maritima.*

Section 7.—**Ixochiron.** *Calyx* 5-fid, viscid; *corolla-tube* cylindric, uniform; *anthers* straight; *ovary* acute, ovoid; *capsule* viscid.

Stems erect; leaves cuneate at base :—

Calyx not longer than corolla-tube, its lobes narrow, acute or acuminate :—

Leaves more or less glandular-scabridulous, especially near margins—S. Africa. 28. *C. scabrida.*

Leaves oblong or elliptic ... ... *α. scabrida, typica.*
Leaves lanceolate-oblong to lanceolate ... *β.* var. *ligulifolia.*

Leaves not glandular-scabridulous—S. Africa. 29. *C. tabularis.*

Leaves ovate or elliptic ... ... *α. tabularis, typica.*
Leaves narrowly ovate-lanceolate to linear *β.* var. *confusa.*

Calyx longer than corolla-tube, its lobes broad, foliaceous—S. Africa. 30. *C. tetragona.*

Leaves ovate or sub-elliptic... ... ... *α. tetragona, typica.*
Leaves narrow-elliptic or lanceolate or linear ... ... *β.* var. *linearis.*

Stems decumbent or scandent, very long; leaves cordate at base; calyx not longer than corolla-tube, its lobes narrow, acute. 31. *C. melampyrifolia.*

Subgenus III.—**Neochironia.** *Fruit* a 2-valved capsule, crustaceous, the valves separating completely to base and readily separating from the torus; *leaves* and *stems* scabridulous-hispid or pubescent.

Section 8.—**Neochiron.** *Calyx* 5-sect; *corolla-tube* cylindric, uniform; *anthers* straight; *ovary* obtuse, ovoid.

Leaves ovate and stems pubescent—Madagascar.
32. *C. madagascariensis.*

Internodes not longer than leaves ... ... *a. madagascariensis, typica.*
Internodes longer than leaves ... ... *β.* var. *pubescens.*

Leaves lanceolate and stems scabridulous-hispid—Madagascar.
33. *C. lancifolia.*

In considering the specimens in the Linnean Herbarium, it has to be recollected that in the first edition of the *Species Plantarum* (1753), pp. 189, 190, LINNAEUS enumerates seven *Chironiae*, four of which, *C. trinervia* (*Exacum*), *C. angularis* (*Sabbatia*), *C. campanulata* (*Sabbatia*), and *C. dodecandra* (*Sabbatia*), are not members of the genus as now defined, and are not African. The other three are African ; one, *C. frutescens*, is now the type of the genus *Orphium*, E. Mey. ; only two, *C. baccifera* and *C. linoides*, are now included in *Chironia*. In 1760 (*Pl. Afr. Rar.*, p. 9) Linnaeus added another species, *C. jasminoides ;* in 1771 (*Mantissa*, p. 207) he described a fourth, which he believed to be *C. lychnoides* as described by P. J. Bergius in 1767. To these the younger Linnaeus added in 1781 (*Suppl.*, p. 151) *C. nudicaulis* and *C. tetragona*. In 1756, however (*Cent.*, ii., p. 12), Linnaeus had published, as *C. caryophylloides*, a species which he subsequently included in *C. frutescens* (*Orphium frutescens*, E. Mey.) ; it is treated above as only a variety of this last species.

The register which Linnaeus kept of his specimens shows that in 1753 only one of the true *Chironiae* enumerated in the *Species Plantarum* was represented in his herbarium. This was *C. baccifera* ; the specimen named by himself is still there, accompanied by a second named by his son. The herbarium also has the specimen, named by Linnaeus himself, described as *C. lychnoides ;* this specimen represents a variety of his own *C. jasminoides*, and is not *C. lychnoides*, Berg. The specimens from which the younger Linnaeus described *C. nudicaulis* and *C. tetragona*, both named by their author, are also present ; the latter represents a valid species ; the former is only another local form of *C. jasminoides*, Linn.

There is a specimen in the Linnean Herbarium named *C. jasminoides*, but the name was not written by Linnaeus or by his son ; and the plant itself, which is a variety of *C. tetragona*, Linn. f., does not accord with the original description of *C. jasminoides*. That description is unusually full, and is so precise that, notwithstanding the considerable accession of new forms since 1760, it is still applicable to only one of the known species of *Chironia*. The plant on which the description was based was collected by Burmann ; and whilst it is true that, so far as is known, no specimen now exists on which Linnaeus himself has written the name *C. jasminoides*, there still exist specimens, collected by Burmann, of a plant to which alone the Linnean description is applicable, that have been named *C. jasminoides* by contemporaries of Linnaeus.

The absence from the Linnean Herbarium of any specimen of *C. linoides* at the time that this name was published compels us to seek elsewhere for the evidence required to establish the identity

of the species intended. This evidence is readily available, and is unequivocal. Under *C. linoides* Linnaeus gave only three citations : *Hort. Cliffort.*, p. 54, n. 1 ; *Roy. lugdb.*, 433 ; *Breyn. Cent.*, p. 175, t. 90. The specimens alluded to in the first and second citations still exist ; they are specifically identical, and belong to the well-known garden-plant whereof Breynius has supplied a figure that is remarkable for its fidelity, particularly when the date of its appearance (1678) is considered. The Linnean Herbarium now contains four specimens on two sheets, all named *C. linoides* by Linnaeus himself, but all added to the Herbarium after 1753. On the first sheet there are three specimens, two of which represent *C. linoides* as limited in the *Species Plantarum ;* the third, from its position on the sheet, was apparently attached after the other two ; it is not *C. linoides*, Linn., but is the plant that, as their original specimens show, is *C. linoides*, Thunb., not of Linn., *C. linoides*, var. *subulata*, E. Mey., *C. vulgaris*, var. *intermedia*, Cham., and *C. gracilis*, Salisb., not of Michx. We know that Linnaeus became acquainted with this plant in, or prior to, 1767, since it is to its existence that we owe the intercalation of a new character, " calycis foliola subulata," accurate as regards *C. gracilis*, but incorrect as regards *C. linoides*, which occurs in the twelfth edition of the *Systema Naturae.* The other sheet of *C. linoides* in the Linnean Herbarium has a solitary specimen which is neither *C. linoides* nor *C. gracilis ;* it is the plant that we know from their original specimens to be *C. linoides*, Berg., not of Linn., *C. uniflora*, Eckl., not of Lamk, *C. linoides*, var. *Zeyheri*, Griseb. ; *C. linoides*, var. *brevisepala*, Schoch, and *C. vulgaris*, var. *lychnoides*, Cham. This plant was fully described in 1821 by Jarosz (*Pl. Nov. Cap.*, p. 11) as *C. emarginata*, and, like *C. gracilis*, is best considered a valid species. We know that Linnaeus had not seen this plant in 1767, but that he became acquainted with it between 1767 and 1774, since it is to its existence that we owe the substitution in the thirteenth edition of the *Systema Vegetabilium* of the fresh character " calyces semi-5fidi obtusi," true as regards *C. emarginata*, but incorrect as regards both *C. linoides* and *C. gracilis*, for the equally incorrect character " calycis foliola subulata " of the twelfth edition of the *Systema Naturae.*

P. J. Bergius in 1767 (*Descr. Pl. Cap.*, pp. 43-47) described three species of *Chironia* from S. Africa ; *C. linoides*, *C. lychnoides* and *C. frutescens.* The last of these, as the description and citations show, is *C. frutescens*, Linn., and therefore *Orphium frutescens*, E. Mey. Thanks to the kind help of Professor V. B. Wittrock, now in charge of the Bergian collection, it has been possible to ascertain definitely what the others are. *C. linoides*, Berg., although the description given is preceded by citations that in the main refer to *C. linoides*, Linn., is not the plant so named by Linnaeus, but is the plant described as *C. emarginata* by Jarosz. *C. lychnoides*, Berg., first described by Bergius in 1767, is quite different from the plant to which Linnaeus ascribed this name in 1771, and is merely the well-known garden-plant which in 1753 Linnaeus had named *C. linoides.*

From Lamarck's account of *Chironia* (*Encyc. Math.*, i., pp. 736, 737) we learn that in 1783 he possessed specimens of only four true *Chironiae.* These were *C. lychnoides*, under which he noted

that the account of Linnaeus does not agree with that by Bergius, and explained that he had no authentic specimen, adding—" Nous avons dans notre Herbier une plante de ce genre que nous parôit pouvoir se rapporter à cette espèce " ; *C. linoides*, as to which he has remarked—" on en trouve une variété beaucoup plus petite " ; *C. uniflora*, proposed as a new species ; and *C. jasminoides*. The courteous assistance of Professor Lecomte has made it possible to learn what the specimens thus alluded to actually are. The sheet with the specimen of *C. lychnoides*, Lamk, not of Berg., has a label with the legend written by Lamarck, " C. lychnoides ? " ; immediately above this label is another, on which Lamarck has written " C. melampyrifolia, lam. ill." The specimen doubtfully referred to *C. lychnoides* in 1783 is thus the actual specimen on which Lamarck based his diagnosis of *C. melampyrifolia* published (*Ill. Gen.*, i., p. 479) in 1791. This species was more fully characterised by Poiret (*Encyc. Meth. Suppl.*, ii., p. 233) in 1811. It is one of the most distinct and one of the most widely spread in South Africa. It is the species which Thunberg described as *C. jasminoides* in 1804, though it is not the only plant which Thunberg issued under this name. It has besides been fully characterised on three subsequent occasions ; by Ecklon in 1830 as *C. perfoliata ;* by Meyer in 1837 as *C. speciosa ;* by Paxton in 1849 as *C. glutinosa.*

The specimen which Lamarck has named *C. linoides* occupies a special sheet ; it is the well-known garden-plant, *C. linoides*, Linn. Another sheet which bears the legend in Lamarck's handwriting—" paroit n'etre qu'une variété du Chironia linoides," has two specimens ; the smaller of these is *C. linoides*, Thunb., not of Linn. (*C. gracilis*, Salisb.) ; the larger is *C. linoides*, Berg., not of Linn. (*C. emarginata*, Jarosz).

The sheet on which Lamarck has written " Chironia uniflora. enc." has the actual specimen described (*Encyc. Meth.*, i., p. 737), and figured (*Ill. Gen.*, t. 108, f. 3) as *C. uniflora*, Lamk. This specimen represents the form of *C. tetragona*, Linn. f., described by Grisebach in 1839 as var. *brevifolia*, and is one of the two forms included by E. Meyer in 1837 in his *C. tetragona*, var. *linearis*. In 1839 and again in 1845 Grisebach has described Lamarck's figure as bad ; the figure, however, represents with fidelity the specimen from which it was drawn ; Grisebach's adverse criticism has probably been a result of the fact that he referred it to another species which, naturally, it does not well represent.

The remaining sheet in Lamarck's herbarium bears the legend " Chironia jasminoides." This legend refers to two specimens, one of which was figured by Lamarck (*Ill. Gen.*, t. 108, fig. 2) under this name. The two specimens belong to the same form ; they belong moreover to the form represented by the plant collected by Burmann, to which every botanist, prior to Thunberg, had given the name *C. jasminoides*, and they represent the only species that accords in all respects with Linnaeus's original description of *C. jasminoides*. Grisebach has suggested that Lamarck's figure represents that particular variety of the species named *C. nudicaulis*, Linn. f. This is not the case ; the specimen figured belongs to typical *C. jasminoides*, Linn. It is, however,

interesting to find that a smaller sheet, on which Lamarck has written only the word "Chironia," has a solitary specimen of the form of *C. jasminoides* which the younger Linnaeus did name *C. nudicaulis*, and that Lamarck has affixed this small carton to his original sheet of *C. jasminoides*.

THUNBERG in 1794 (*Prodr. Pl. Cap.*, i., p. 35) enumerated seven species of *Chironia* from South Africa. In 1803 he prepared a fuller account of these; this was published (*Trans. Linn. Soc.*, vii., pp. 248–253) in 1804. The information then given was repeated in 1813 (*Flor. Cap.*, ii., pp. 107–111). The paper printed by the Linnean Society is accompanied by figures of the two species which the younger Linnaeus published (*Suppl.*, p. 151) in 1781 from specimens that Thunberg had given him. As regards these two species, *C. tetragona*, Linn. f. (*Trans. Linn. Soc.*, vii., t. 12, fig. 2) and *C. nudicaulis*, Linn. f. (*ibid.* t. 12, fig. 3) there is therefore no dubiety. Nor is there any with regard to *C. frutescens*, Thunb., which is the Linnean species so named, and therefore is *Orphium frutescens*, E. Mey. The other four species only become intelligible when the actual specimens used by Thunberg are studied; the kind help of Professor Juel, of Upsala, has allowed of this being done.

In the Thunberg herbarium, *C. baccifera* is represented by one sheet with two specimens. These specimens differ slightly; one represents typical *C. baccifera*, Linn.; the other is *C. baccifera*, var. *Burchellii*. There is only one sheet marked *C. linoides* in the Thunberg herbarium; the species represented is not *C. linoides*, Linn., but *C. gracilis*, Salisb.

The herbarium of Thunberg has four sheets named by him *C. lychnoides*. The species present on two of the sheets, α and γ, is the well-known garden-plant *C. linoides*, Linn. The sheet marked β has another species, *C. maritima*, Eckl., not of Willd. The sheet marked δ has yet another, *C. gracilis*, var. *macrocalyx*. The description given by Thunberg is rather vague, perhaps as the result of an attempt to cover three species, but it includes one character, "flowers terminal solitary," which renders it applicable only to *C. maritima*, Eckl. (sheet β), and excludes the other two. It seems, however, probable that the plant which Thunberg more particularly had in view is not *C. maritima*, but *C. linoides*, since this species has supplied half his material, and since he says of the species which he termed *C. linoides*, but which is *C. gracilis*, that it is nearly allied to, and may be no more than a variety of his *C. lychnoides*. If we could be certain as to this, then *C. lychnoides*, Thunb., is really the original *C. lychnoides*, Berg. But even so, the agreement between Thunberg and Bergius is fortuitous, for Thunberg does not cite *C. lychnoides*, Berg., as a synonym. On the contrary, he quotes *C. lychnoides*, Linn., and therefore quotes a plant that is not *C. lychnoides*, Berg., and that differs greatly from all three species to which Thunberg has applied the name *C. lychnoides*.

The plant which Thunberg described as *C. jasminoides* we know cannot be *C. jasminoides*, Linn., because the true *C. jasminoides*, as originally described by Linnaeus, has erect leaves, flowers in terminal erect dichotomous panicles with opposite subulate bracts, and a deeply divided calyx with lanceolate acuminate lobes; whereas *C. jasminoides*, Thunb., as described by Thunberg, has

alternate divaricate branches with spreading leaves that have reflexed tips and edges, solitary flowers on terminal peduncles that are continuous with the branches, and an angular calyx with ovate acute lobes. The herbarium of Thunberg contains three sheets on which the name *C. jasminoides* has been written. That marked *α* has only *C. melampyrifolia*, Lamk ; this is the plant to which the description of *C. jasminoides*, Thunb., not of Linn., applies ; it is the only *Chironia* that has solitary flowers and an angular calyx and that at the same time has divaricate branches with spreading leaves that have reflexed tips and edges. The sheet marked *β* has only *C. tetragona*, var. *linearis*, E. Mey. ; that marked *γ* has again *C. tetragona*, var. *linearis*, but with this is associated another form of *C. tetragona*, Linn. f., which differs from typical *C. tetragona* in having the leaves sub-elliptic instead of ovate ; this form has been considered by E. Meyer to be referable to typical *C. tetragona* rather than to var. *linearis*. The only characters in Thunberg's description of *C. jasminoides* that are applicable to the species on his sheets *β* and *γ* are those of 'an angled calyx' and of 'solitary flowers on terminal peduncles that are continuous with the branches.' What we find therefore is that Thunberg has given a description of *C. jasminoides* which is applicable only to *C. melampyrifolia*, Lamk ; that he has associated with this species in his herbarium two forms of *C. tetragona*, Linn. f., to which his description of *C. jasminoides* is inapplicable ; that neither of the species named *C. jasminoides* by Thunberg can possibly be *C. jasminoides*, Linn. An examination of the specimens in various collections that are noted as having been issued by Thunberg shows that he rarely distributed as *C. jasminoides* the species he described under that name. The form that in most instances he gave away as *C. jasminoides* is *C. tetragona*, var. *linearis*, E. Mey., which is represented in his herbarium by sheet *β* ; in particular, it was this form that reached the younger Linnaeus along with the original specimens of *C. tetragona* and *C. nudicaulis*. This specimen of *C. tetragona*, var. *linearis*, is still in the Linnean Herbarium, and still misrepresents *C. jasminoides*, Linn., in that collection.

Of the sixteen species attributed by WILLDENOW to *Chironia* in 1797 (*Sp. Pl.*, i., 2, pp. 1065–1071) that are represented in his herbarium by specimens, Dr. Gilg finds that only four really belong to the genus. The courtesy of Professor Engler has afforded an opportunity of examining these specimens, which constitute nn. 4500, 4501, 4505 and 4506 of Willdenow's exsiccata. No. 4500, marked "Fleuron, W.," and named *C. jasminoides*, is *C. melampyrifolia*, Lamk, and is therefore the plant described by Thunberg as *C. jasminoides*, but is not *C. jasminoides*, Linn. ; 4501, marked "Jacquin, W.," and named *C. nudicaulis*, is not precisely *C. nudicaulis*, Linn. f., but is the plant figured by Lamarck as *C. jasminoides*, and therefore is the true *C. jasminoides*, Linn. ; 4505, marked "Wendland, W.," and named *C. linoides*, is the true *C. linoides*, Linn. ; finally 4506, marked "Hunneman, W.," and named *C. baccifera*, is the true *C. baccifera*, Linn.

When R. BROWN, in 1810 (*Prodr. Nov. Holl.*, i., 451), first placed the genus *Chironia* on a sound footing, he recognised five

legitimate and two doubtful species. The specimens at the British Museum indicate that *C. jasminoides*, R. Br., is the true *C. jasminoides*, Linn.; there are specimens in the British Museum collection so named by Solander, and so accepted by Brown. *C. lychnoides*, R. Br., may be assumed to be *C. lychnoides*, Linn., not the original *C. lychnoides*, Berg.; although there is no sheet on which Brown has written the name *C. lychnoides*, the authentic sheet of *C. lychnoides*, Linn., not of Berg., was within his reach. At the same time we know that *C. linoides*, R. Br., is the true *C. linoides*, Linn., for Brown had access to the actual plant cited by Linnaeus from *Hort. Clifford.*, p. 54, n. 1, and it is this plant which constitutes the original *C. lychnoides*, Berg. *C. nudicaulis* and *C. tetragona*, enumerated by Brown, are the plants so named by the younger Linnaeus. Brown's *C. baccifera* is *C. baccifera*, Linn., and his *C. frutescens* is the Linnean plant so named, now known as *Orphium frutescens*, E. Mey.

Not long after the appearance of Brown's important note a species unknown in early collections found its way into European gardens, and was cultivated under the name *C. jasminoides*. An account of this plant, which is not *C. jasminoides*, Linn., and is not either of the species dealt with under *C. jasminoides* by Thunberg, appeared in 1817 (*Bot. Reg.*, iii., t. 197). In this case there is no doubt as to the plant intended; the figure supplied by EDWARDS is excellent, and the description, presumably written by Ker-Gawler, is full and accurate. Specimens of the plant occur in various contemporary collections, notably one at Kew, originally in the Herbarium of Sir W. Hooker, and one at Cambridge, originally in the Lindley Herbarium. This species agrees with both the species treated by Thunberg as *C. jasminoides* in having an angled calyx, and in having solitary flowers on terminal peduncles that are continuous with the branches. It agrees tolerably well as regards foliage with the form of *C. tetragona*, Linn. f., with sub-elliptic leaves that occurs on sheet γ of *C. jasminoides*, Thunb., in the Thunberg Herbarium, but is readily distinguished from that plant by its ovate acute in place of broad foliaceous calyx-lobes. It agrees with the plant described by Thunberg as *C. jasminoides* (Herb. Thunberg, sheet α) as regards calyx-lobes, but differs greatly in habit and foliage. It is, therefore, obviously nearly allied to both, and differs as widely as they do from the true *C. jasminoides*, Linn. The plant of the *Botanical Register* is, in fact, a species that had not previously been described, and we are indebted to an English nurseryman—Page, of Southampton—for having detected this fact and for supplying the species with a distinctive name. In Page's catalogue (*Page, Prodr.*, p. 121) issued in 1817 we find the name *C. tabularis* (actually printed "tabulare") used in substitution for the name *C. jasminoides*, which appears in contemporary plant-lists, and which, we know, did not indicate either *C. jasminoides*, Linn., or *C. jasminoides*, Thunb., because neither of these was then in cultivation. With the exception of Steudel, authors have treated *C. tabularis*, Page, as a *nomen nudum*, and therefore negligible. Grisebach, indeed, and—following Grisebach's example—Schoch have stated that Page's name is of doubtful incidence. This, as the evidence adduced shows, is not the case. But if this evidence had been less conclusive than it is, all doubt

as to the incidence of the name is removed by the fact that Wendland, who grew the species at Herrenhausen under the name *C. tabularis*, presented a specimen so named to E. Meyer, among whose plants it still is.

Chamisso and Schlechendal, in 1826, discussed cursorily the *Chironiae* from the Cape collected during the Romanzoff expedition (*Linnaea*, i., pp. 190, 191) and in 1831 Chamisso alone dealt more fully with the species sent by Ecklon from South Africa (*Linnaea*, vi., pp. 343-345). Their *C. baccifera*, only alluded to in 1826, more fully dealt with in 1831, is mainly *C. baccifera*, Linn.; one of Ecklon's gatherings is, however, *C. baccifera*, var. *Burchellii*. *C. frutescens*, dealt with in both places, is *C. frutescens*, Linn. (*Orphium frutescens*, E. Mey.). Chamisso and Schlechtendal recognised two varieties, *α hirsuta* and *β glabra*. There are two tolerably distinct varieties in this species, one with flat, often fairly broad and almost always pubescent leaves, the other with semi-terete, always narrow and usually nearly glabrous leaves. The varieties recognised by Chamisso and Schlechtendal do not quite coincide with these apparently natural varieties, for our authors have placed in their var. *hirsuta* such specimens of the narrow-leaved plant as chance to have pubescent leaves. This prevents their variety *β glabra* from corresponding precisely to *C. caryophylloides*, Linn. (*C. angustifolia*, Sims).

Chamisso dealt in 1831 with what he believed to be *C. jasminoides*, Linn., but doubted being *C. jasminoides*, Thunb. His specimens show that, like Thunberg, Chamisso included two distinct species in *C. jasminoides;* all his specimens from the Cape Division represent *C. scabrida*, var. *ligulifolia*, while all those from the Caledon Division belong to *C. tabularis*, var. *confusa*. The two species that form *C. jasminoides*, Cham., agree with the two species that form *C. jasminoides*, Thunb., in that they belong to the section *Ixochiron*, Griseb. They, therefore, both differ from the true *C. jasminoides*, Linn., which is a *Hippochiron*, as greatly as do the two plants which constitute *C. jasminoides*, Thunb. Neither of Chamisso's plants corresponds to either of the species included in *C. jasminoides*, Thunb.; one of the two plants included in *C. jasminoides*, Cham., is, however, a variety of *C. jasminoides*, Edw., not of Linn.

C. linoides, alluded to in 1826 and *C. lychnoides*, more fully dealt with then, were treated by Chamisso in 1831 as forms of one species, for which he proposed a new name, *C. vulgaris*, Cham. *C. linoides*, Cham. & Schlecht. (1826), and *C. vulgaris*, *α linoides*, Cham. (1831), are found from the specimens so named to be identical and to be the true *C. linoides*, Linn. Chamisso explained in 1831 that *C. lychnoides*, Cham. & Schlecht. (1826), included *C. vulgaris*, *β intermedia*, Cham., and *C. vulgaris*, *γ lychnoides*, Cham., of the second paper. In 1826, however, Chamisso and Schlechtendal had recognised in *C. lychnoides* three forms, not two; (1) with broad rounded submucronulate calyx-teeth, (2) with ovate acuminate calyx-teeth, (3) with narrow triangular calyx-teeth. The two varieties recognised in 1831 are *β intermedia*, with triangular calyx-lobes, sometimes rather short, sometimes elongated, and *γ lychnoides*, with short widened subauriculate calyx-lobes. The specimens show that *C. vulgaris*, *β intermedia*, Cham. (1831),

corresponds to *C. lychnoides*, Cham. & Schlecht., not of Berg. (1826) so far as the forms (2) with ovate acuminate calyx-lobes and (3) with narrow triangular calyx-lobes are concerned—(2) of 1826 being that portion of *β intermedia* of 1831 with "rather short" calyx-lobes, while (3) of 1826 is that portion of *β intermedia* with "elongated" calyx-lobes. On the other hand *C. vulgaris*, *γ lychnoides*, Cham. (1831), corresponds to *C. lychnoides*, Cham. & Schlecht., not of Berg. (1826), so far only as the form (1) with broad rounded submucronulate calyx-lobes is concerned.

In 1826 Chamisso and Schlechtendal indicated that their *C. lychnoides*, which is very unlike *C. lychnoides*, Linn., and while it includes at least two distinguishable forms, is not even in part identical with the original *C. lychnoides*, Berg., corresponds to *C. emarginata*, Jarosz, a species published in 1821 (*Pl. Nov. Cap.*, p. 11). They were, however, unable to take up this name, partly because Jarosz did not attach his determination to the specimens on which he based his description, partly because they considered all the descriptions of Jarosz to be imperfect. The description which Jarosz has given of *C. emarginata* is, however, satisfactory, and whatever may be the case as regards descriptions by Jarosz of suggested new species in other genera, the general criticism of Chamisso and Schlechtendal fails in this particular case. It has, however, to be remembered that when Jarosz proposed the recognition of his *C. emarginata*, the object he had in view was that at which Chamisso and Schlechtendal themselves were aiming, viz. :—the definite segregation from the original *C. linoides*, Linn., of the foreign elements which Linnaeus himself, in both cases at the expense of intercalating characters that exclude his original plant of 1753, had unfortunately added to *C. linoides* proper in 1767 and 1774.

An effort to attain this object, though possibly an unconscious one, was made by Bergius in 1767, when he limited the name *C. linoides* to the plant for the first time incorporated by Linnaeus in that species in 1774, and proposed for the true *C. linoides* the new name *C. lychnoides*. We have no means of judging whether Bergius intended the name *C. linoides* to be restricted to the particular plant represented in his herbarium and described in his work, because Bergius appears never to have seen the other plant included in *C. lychnoides*, Cham. & Schlecht., not of Berg. nor of Linn., which Linnaeus incorporated in *C. linoides* in 1767. We know, however, that when in 1783 Lamarck again endeavoured to effect the necessary segregation—for Lamarck's *C. linoides*, var. (variété beaucoup plus petite), is identical with *C. lychnoides*, Cham. & Schlect., not of Berg. nor of Linn.—he included both the Linnean plants that are alien to *C. linoides* in his segregate. When the attempt was repeated a third time in 1794 by Thunberg, we have seen that, although *C. lychnoides*, Thunb., is not clearly dealt with, the probability is that he intended this name to apply to the true *C. linoides*, Linn., and we know that the name *C. linoides*, Thunb., is definitely restricted to the alien form incorporated by Linnaeus in his widened *C. linoides* in 1767. But in this instance we have evidence that the limitation was fortuitous and not deliberate, because Thunberg had actually gathered, and issued as *C. linoides*, specimens of the plant which

Linnaeus did not incorporate in *C. linoides* till 1774. He therefore, like Lamarck in 1783, and like Chamisso and Schlechtendal in 1826, looked upon these two plants as conspecific, and the fact that he retained only one of them in his own herbarium was no doubt an accident.

When on further consideration Chamisso decided, in 1831, that, after all, the three plants in question might be treated as conspecific, he adopted Lamarck's treatment in so far as typical *C. linoides*, Lamk (the true *C. linoides*, Linn.), is concerned, and only went one step further than Lamarck in treating as two distinct varieties the two plants which Lamarck had treated as one variety. Chamisso apparently did not, when reconsidering the question, again refer to the description which Jarosz had provided for his *C. emarginata*. When this is done it is seen that, even if Jarosz did mean the name *C. emarginata* to cover both *C. vulgaris*, *β intermedia*, Cham., and *C. vulgaris*, *γ lychnoides*, Cham., the description itself excludes *β intermedia* and applies only to *C. vulgaris*, *γ lychnoides*, Cham.

C. nudicaulis was only alluded to in 1826. In 1831 Chamisso treated the original *C. nudicaulis*, Linn. f., as one variety (*α tabularis*) of a species to which he referred, as a second variety (*β elongata*), a plant received from the Cape as *C. elongata*, Eckl. MSS. *C. elongata* is a rather narrow-leaved form of the true *C. jasminoides*, Linn., and Chamisso was clearly right in treating this plant and *C. nudicaulis*, Linn. f., as varieties of one species. There is nothing in the text to show that in applying to *C. nudicaulis* the new epithet "tabularis," Chamisso was endeavouring to account for *C. tabularis*, Page, or indeed to suggest that Chamisso was aware of the existence of Page's name. The epithet is appropriate for *C. nudicaulis*, since this form is almost exclusively restricted to Table Mountain.

E. Meyer in 1837 (*Comm. Pl. Afr. Austr.*, ii., pp. 177–182) described the species collected in South Africa by Drège. On *C. frutescens*, Linn., he based the genus *Orphium*, so that by citation *Orphium frutescens*, E. Mey., and *C. frutescens*, Linn., are exactly synonymous. It so happens, however, that all the specimens obtained by Drège represent *C. caryophylloides*, Linn. (*C. angustifolia*, Sims), so that, as regards description, *O. frutescens*, E. Mey., is really var. *β angustifolia*, Griseb.

Two species of *Chironia* were treated by Meyer as types of another genus, *Plocandra*, E. Mey. *P. albens*, the first of these, was divided into two forms or varieties—*α* "robustior," and *β radicata*. The latter is a plant that had been described by Burchell in 1824 (*Trav.*, ii., p. 226) as *C. palustris*; the former is *C. palustris*, var. *foliata*. The other species, *P. purpurascens*, was rightly referred to *Chironia* in 1876 by Bentham and Hooker (*Gen. Pl.*, ii., p. 805).

C. arenaria, E. Mey., as described, is a species with narrow leaves and cuspidate corolla-lobes. With it Drège gathered another form with broader leaves and non-cuspidate corolla-lobes which is not covered by the description; this was distributed among Drège's plants along with *C. arenaria* proper. Schoch, who detected this

confusion in 1902, has described the second form as *C. mediocris* (*Bull. Herb. Boiss.*, ser. 2, ii., p. 1011). It is, however, only a variety, though a very distinct one, of *C. arenaria*.

The specimens named *C. baccifera* by E. Meyer represent three varieties. Those from Nieuwekloof are *C. baccifera*, Linn.; those from the Zwartkops River are var. *grandiflora*, Griseb.; those from Paarlberg are var. *Burchellii*. *C. baccifera*, var. *elongata*, E. Mey., is a long-peduncled form, but not a distinct variety, of *C. baccifera*, Linn.; var. *dilatata*, E. Mey., is however a distinct and valid variety, almost entitled to rank as a species.

C. jasminoides, E. Mey., is the species figured as *C. jasminoides* by Edwards (*Bot. Reg.*, iii., t. 197); it therefore is *C. tabularis*, Page. From a note on a specimen in Meyer's herbarium we learn that Meyer was aware that this species had been named *C. tabularis*, but that Meyer had been unable to ascertain when or by whom the name had been applied.

C. latifolia, E. Mey. (1837), is *C. pedunculatis*, Lindl., *Bot. Reg.*, xxi., t. 1803 (1836).

The specimens named *C. linoides* by E. Meyer represent three species. Those from Rondebosch, from Ezelsbank and from the Kaffirkuils River belong to *C. linoides*, Linn. That from Wupperthal is a narrow-leaved form of *C. Zeyheri*, a species only known from Clanwilliam Division; that from Elands Kloof is the form of *C. vulgaris*, β *intermedia*, Cham. (*C. gracilis*, Salisb.), with rather short obtuse calyx-teeth. The form of *C. vulgaris*, β *intermedia*, Cham., with elongated calyx-teeth, has been treated by Meyer as a distinct variety of *C. linoides* (var. *subulata*, E. Mey.).

C. lychnoides, E. Mey., is not, as Meyer thought, *C. lychnoides*, Berg. (*C. linoides*, Linn.). It is not quite *C. lychnoides*, Linn. (*C. jasminoides*, var. *viminea*, Griseb.), but it is very nearly so, because it is *C. elongata*, Eckl. (the narrow-leaved form of true *C. jasminoides*, Linn.).

C. melampyrifolia, E. Mey. (1837), is not *C. melampyrifolia*, Lamk, but is a previously undescribed species, which has since been named *C. laxa*, Gilg, *Engl. Bot. Jahrb.*, xxvi., p. 105 (1898).

C. nudicaulis, E. Mey., is *C. nudicaulis*, Linn. f. (*C. jasminoides*, var. *tabularis*).

C. parvifolia, E. Mey. (1837) is *C. serpyllifolia*, Lehm., *Ind. Sem. Hort. Hamb.*, p. 16 (1828). The specimens represent two varieties, those from Van Staadesberg being var. *microphylla*, Griseb.

C. speciosa, E. Mey. (1837), is *C. melampyrifolia*, Lamk, *Ill. Gen.*, i., p. 479 (1791).

C. tetragona, as understood by E. Meyer, and his treatment cannot well be improved, includes four forms: (1) with ovate leaves (the original *C. tetragona*, Linn. f., and Thunb.); (2) with sub-elliptic leaves (a form united by Thunberg, on sheet γ of Herb. Thunb., with *C. jasminoides*, Thunb., not of Linn.); (3) with linear-lanceolate leaves (the original *C. uniflora*, Lamk); (4) with linear leaves (a form distributed by Thunberg as *C. jasminoides*, Thunb., not of Linn., and represented on sheet β and in part on

sheet γ of *C. jasminoides* in Herb. Thunb., but not covered by Thunberg's description). Forms (1) and (2) together constitute *C. tetragona*, α *ovata*, E. Mey.; forms (3) and (4) together constitute *C. tetragona*, β *linearis*, E. Mey.

GRISEBACH twice monographed the genus *Chironia*; first in 1839 (*Gen. & Sp. Gent.*, pp. 96-107), again in 1845 (*DC. Prodr.*, ix., pp. 39-41). These two accounts must be considered separately because there is no allusion in the earlier work to Meyer's paper of 1837, while there is internal evidence that it was written without knowledge of Drège's specimens or Meyer's conclusions. The later work is essentially a précis of the account by Meyer, published in 1837, and of Grisebach's own work published in 1839, with some emendations and a few references to further material. One striking feature in Grisebach's work is the paucity of the specimens which he cites under individual species. In a number of cases we learn, both from internal evidence and from the existence in various collections of specimens authentically named by Grisebach himself, that the citations under habitat are intended to be representative rather than exhaustive. At the same time he has set another pitfall for the unwary by reason of his quoting among these representative specimens plants referred to by other authors which he has intimated, by the omission of the verification symbol, that he did not himself examine. This involves the necessity, perhaps not always taken into account, for a closer study of Grisebach's *ipsissima verba* than is essential in the case of authors who adduce large suites of specimens in evidence of the characters and the validity of their species. Grisebach's descriptions, however, have been drafted with much care, and in no case are we left in doubt as to the particular form intended, even when the specimens cited are not all in accord with each other and with the diagnoses.

Chironia frutescens, Griseb. (1839), is *C. frutescens*, Linn., subdivided after the fashion adopted by Chamisso and Schlechtendal in 1826, with, however, the recognition of an additional variety γ *orthostylis*, and the alteration of the name β *glabra*, Cham. & Schlecht., to β *angustifolia*. The variety *orthostylis*, based on *C. orthostylis*, Reichb., is only a sport under cultivation of typical *C. frutescens* and cannot be sustained. But the variety β *angustifolia*, Griseb., corresponds more precisely with the limits of *C. caryophylloides*, Linn. (*C. angustifolia*, Sims), than does the variety β *glabra*, Cham. & Schlecht.; Grisebach's name is therefore to be preferred.

Chironia Krebsii, Griseb. (1839), is a valid species.

Chironia nudicaulis, Griseb. (1839), is treated after the fashion adopted by Chamisso in 1831, with the recognition of an additional variety, γ *viminea*. Grisebach's typical *C. nudicaulis* is *C. nudicaulis*, α *tabularis*, Cham., and is therefore *C. nudicaulis*, Linn. f. (*C. jasminoides*, δ *tabularis*). But *C. nudicaulis* β *elongata*, Cham., which is based on specimens from the Cape Flats and is *C. elongata*, Eckl. n. 175 (*C. jasminoides*, Linn.), was less comprehensive than *C. nudicaulis*, β *elongata*, Griseb., because Grisebach has included, along with Ecklon's n. 175, both the form of true *C. jasminoides* with broader leaves and another form

collected by Ecklon at Voormansbosch near Swellendam, which is the type of *C. nudicaulis*, δ *multiflora*, Eckl. (*C. jasminoides*, γ *multiflora*). Grisebach's *C. nudicaulis*, γ *viminea* is of especial interest because it represents *C. lychnoides*, Linn., not of Berg. (*C. jasminoides*, β *viminea*).

Chironia peduncularis, Griseb. (1839), is Lindley's species so named.

Chironia maritima, Griseb. (1839), is *C. maritima*, Eckl., published (*South Afr. Quart. Journ.*, i., p. 370) in 1830. The name may be maintained because the original *C. maritima*, Willd., happens to be an *Erythraea*.

Chironia jasminoides, Griseb. (1839), is not *C. jasminoides*, Linn., because *C. jasminoides*, Griseb., according to Grisebach's description, is an undershrub with alternate branches, solitary flowers, and a calyx in which the tube and the lobes are of about equal length; whereas *C. jasminoides*, Linn., as described by Linnaeus, has a herbaceous stem, has its flowers in terminal erect dichotomous panicles with opposite subulate bracts, and has a 5-partite calyx. Not being *C. jasminoides*, Linn., it might be anticipated that *C. jasminoides*, Griseb., should prove to be *C. jasminoides*, Thunb., if not entirely then at least in part. Grisebach has cited, under *C. jasminoides*, as representative of his species, Thunberg's gathering from the Swellendam Division which was named by Thunberg *C. jasminoides*, but which is composed of *C. melampyrifolia* and two forms of *C. tetragona*. The only specimens, however, that Grisebach has quoted with a mark of affirmation are one collected by Krebs and one in Herb. Willdenow, both of which are *C. melampyrifolia*. He has, though doubtfully, quoted *C. melampyrifolia*, Lamk, as a synonym of his *C. jasminoides*; he has also definitely quoted *C. uniflora*, Lamk, which is a form of *C. tetragona*, as another synonym of *C. jasminoides*, Griseb. But this evidence, which at first sight seems to show that *C. jasminoides*, Griseb., must be equivalent to *C. jasminoides*, Thunb., does not stand the test of closer scrutiny. In the first place the gathering from Swellendam in Thunberg's Herbarium, which is a mixture of three different things was not actually seen by Grisebach. In the second place the figure of *C. uniflora*, Lamk, which represents with fidelity the specimen on which Lamarck based his species, is said by Grisebach to be poor. Since it represents adequately the species that it really illustrates, Grisebach's judgment only indicates that it represents badly the plant supposed by Grisebach to be *C. jasminoides*. Further, the two species involved in *C. jasminoides*, Thunb., are accounted for independently by Grisebach; *C. perfoliata*, Eckl., which Grisebach upholds, is *C. melampyrifolia*, Lamk; *C. tetragona*, var. *brevifolia*, Griseb., is the actual *C. uniflora*, Lamk (*C. tetragona*, var. *linearis*, E. Mey). Finally, the description of *C. jasminoides*, Griseb., does not apply to *C. melampyrifolia*, Lamk, as regards foliage, while the account of the calyx of *C. jasminoides*, Griseb., as Grisebach himself points out, is such as to definitely exclude every form of *C. tetragona*.

These identifications of specimens of *C. melampyrifolia* with *C. jasminoides* are not the only instances to be met with;

there is in Herb. Kew another sheet of *C. melampyrifolia* which Grisebach has himself named *C. jasminoides*; however, in this case, he has added the note :—"these specimens approach to *C. perfoliata*, Eckl." In one or two cases also, in various collections, Grisebach has, in spite of the caution he himself enjoined, attached the name *C. jasminoides* to specimens of *C. tetragona*, var. *linearis*. But Grisebach has explained that his *C. jasminoides* is nearly allied to *C. tetragona*, and Knoblauch has even suggested (*Bot. Centralbl.*, lx., p. 328) that the two may be but forms of one species.

The majority of the specimens named *C. jasminoides* by Grisebach belong, however, to a plant with which his description does agree in every respect. This plant is one that was collected by Ecklon in various localities in the Caledon Div., and that constitutes part of *C. jasminoides*, Cham., but not of Linn. nor of Thunb. ; it is a form or variety of *C. tabularis*, Page.

In addition to his typical *C. jasminoides* (*C. tabularis*, var. *confusa*), Grisebach has recognised a variety, *β lychnoides*, so named because he believed it to be *C. lychnoides*, Linn., not of Berg. The plant intended was collected by Ecklon on the Cape Flats and constitutes the remaining part of *C. jasminoides*, Cham., but not of Linn. nor of Thunb. Grisebach has, as he did under the type, quoted a gathering by Thunberg as representing his var. *lychnoides*; he also has mentioned a plant with much longer calyx-lobes as being another form of his var. *lychnoides*. Thunberg's plant in question came from Mount Hottentots Holland and is *C. linoides*, Linn. The plant with long calyx-lobes which Grisebach has himself named *C. jasminoides*, var. *lychnoides*, came from near Cape Town, and is *C. maritima*, Eckl., not of Willd. Thunberg's plant, however, we may exclude from consideration, for Grisebach never saw it ; the specimen of *C. maritima* may also be neglected, for Grisebach has admitted that it does not quite agree with the plant he intended. The plant Grisebach had in view is a variety of his own *C. scabrida*, and is as widely different from *C. lychnoides*, Linn., as it is from the original *C. lychnoides*, Berg.

We find then, when all the circumstances are taken into account, that *C. jasminoides*, Griseb., cannot be *C. jasminoides*, Linn. We find further that *C. jasminoides*, Griseb., was not intended to coincide with *C. jasminoides*, Thunb., and that the coincidence is accidental. Finally, we find that in the case of *C. jasminoides*, as in the cases of *C. frutescens* and *C. nudicaulis*, Grisebach was attempting to adopt the species as defined by Chamisso ; since *C. jasminoides*, Griseb., as a whole, is in intention and very nearly in fact the combination of forms that composes *C. jasminoides*, Cham., not of Linn. and not of Thunb. In this instance, however, Grisebach observed that Chamisso had confused two distinct forms under *C. jasminoides*. Therefore *C. jasminoides*, Griseb., proper, is equivalent to *C. jasminoides*, Cham., so far only as the specimens from Caledon are concerned ; while *C. jasminoides*, Cham., so far as the specimens from the Cape District are concerned, has become *C. jasminoides*, *β lychnoides*, Griseb.

Chironia tetragona, Griseb. (1839), is *C. tetragona*, Linn. f. Grisebach has proposed a variety, *β brevifolia*, which is based on

specimens collected by Ecklon in the plains under the mountains of Winter Hoek, Uitenhage. These specimens represent the plant named *C. uniflora* by Lamarck; they therefore belong to *C. tetragona*, *β linearis*, E. Mey. (1837).

Chironia scabrida, Griseb. (1839), is a valid species. The solitary specimen on which the species is based is at Berlin; this form has never been collected again. The usual form or variety of this species is the plant named by Grisebach *C. jasminoides*, *β lychnoides*. It has long been known, for it is among the oldest plants at Leiden and bears there the unpublished name *C. obtusiflora*. Old specimens of the same form, now at the British Museum, bear another unpublished name, *C. ligulifolia*, Salisb.

Chironia perfoliata, Griseb. (1839), is *C. perfoliata*, Eckl., *South Afr. Quart. Journ.*, i., p. 370 (1830), and is therefore *C. melampyrifolia*, Lamk.

Chironia linoides, Griseb. (1839), is divided into two forms, a typical and a variety *β longifolia*. *C. linoides*, Griseb., is not *C. linoides*, Linn., but is exactly equivalent to *C. lychnoides*, Cham. & Schlecht., not of Berg. (1826); it therefore includes *C. gracilis*, Salisb., and *C. emarginata*, Jarosz. Grisebach knew and distinguished these two component forms, for *C. uniflora*, Eckl., not of Lamk, which he has cited, is identical with *C. emarginata*; he did not, however, think them, as Chamisso did in 1831, varietally separable. *C. linoides*, *β longifolia*, Griseb., is *C. lychnoides*, Berg., and therefore is the true *C. linoides*, Linn. In this case, therefore, as in the case of *C. frutescens*, Linn., Grisebach has adopted the treatment proposed by Chamisso and Schlechtendal in 1826, except that he has transferred the name *C. linoides*, Linn., from the plant to which it really belongs and has attributed it to the combination of forms which constitutes *C. lychnoides*, Cham. & Schlecht., not of Berg., nor of Linn.

Chironia baccifera, Griseb. (1839), is partly *C. baccifera*, Linn., partly *C. baccifera*, var. *Burchellii*; the latter he recognised as a form but not as a variety. Grisebach has recognised as a variety, *β grandiflora*, a local form from Uitenhage, quite entitled to varietal rank.

Chironia serpyllifolia, Griseb. (1839), is *C. serpyllifolia*, Lehm. *Ind. Sem. Hort. Hamb.*, p. 16 (1828). Grisebach has added two varieties *β laxa*, and *γ microphylla*; neither variety is very distinct; *β laxa* may only be a form drawn up because growing among grasses; *γ microphylla* may only be a somewhat depauperate condition due to its presence in poor soil.

In the second monograph Grisebach has accepted Meyer's genus *Orphium*, so that *Chironia frutescens*, with its variety *angustifolia* of 1839, became in 1845 *Orphium frutescens*, with a variety *β angustifolia*, Griseb.

Grisebach also accepted Meyer's genus *Plocandra* and his *P. purpurascens* (1845) is *P. purpurascens*, E. Mey. (*Chironia purpurascens*, Bth. & Hk. f.). But *P. albens*, E. Mey. (1837), has been renamed *P. palustris*, Griseb. (1845); the order of its two

forms has been reversed, so that *P. palustris*, Griseb. (*C. palustris*, Burch.), corresponds to *P. albens*, *β radicata*, E. Mey. (1837). Grisebach has, moreover, reduced *C. Krebsii*, Griseb. (1839), to *P. palustris*, Griseb. (1845); the two plants are, however, specifically separable, and Grisebach's reduction has led to the unnecessary republication of his original species as *C. densiflora* by Scott Elliot, in 1891 (*Journ. Bot.* xxix., p. 69).

Chironia nudicaulis, Griseb. (1845), has been treated as it was in 1839, except that *C. lychnoides*, E. Mey. (1837), not of Berg., has been correctly reduced to *β elongata*.

Chironia peduncularis, Griseb. (1845), has been treated as in 1839, except that *C. latifolia*, E. Mey. (1837), has been correctly reduced to this species.

Chironia maritima, Griseb. (1845), has had its natural character vitiated by the reduction here of *C. melampyrifolia*, E. Mey. (1837), not of Lamk, which is a very distinct species. Grisebach doubtfully recognised a new variety, *β ? frutescens*, Griseb. (1845); this variety is another distinct species, *C. floribunda*, Paxt., *Mag. Bot.*, xi., p. 237 (1844).

Chironia jasminoides, Griseb. (1845), was treated as in 1839, except that the alien forms cited in 1839 under *β lychnoides*, Griseb., have been excluded.

Chironia tetragona, Griseb. (1845), has been treated as in 1839 so far as the typical form is concerned. Grisebach has retained the variety *β brevifolia*, Griseb. (1839), which is the same thing as *C. uniflora*, Lamk. He has, however, at the same time recognised *C. tetragona*, var. *linearis*, E. Mey. (1837), which includes *C. uniflora*, Lamk. The limits of both varieties are further vitiated by the inclusion in *β brevifolia*, Griseb., of *C. jasminoides*, E. Mey. (1837), which is *C. tabularis*, Page, and by the reduction to *γ linearis*, E. Mey. (1837), of *C. viscosa*, Zeyh., which is the same thing as *C. jasminoides*, *β lychnoides*, Griseb. (*C. scabrida*, *β ligulifolia*).

Chironia scabrida, Griseb. (1845), has been treated as in 1839.

Chironia perfoliata, Griseb. (1845), has been treated as in 1839, except that *C. speciosa*, E. Mey. (1837), has been correctly reduced to this species.

Chironia arenaria, Griseb. (1845), as regards intention, corresponds to *C. arenaria*, E. Mey. (1837). But of the two forms distributed by Meyer as *C. arenaria*, only one was covered by the original description. The description of *C. arenaria* given by Grisebach similarly only covers one of the two forms, but in this case the form described is the one that Meyer did not describe. *C. arenaria*, Griseb., as described, is therefore not *C. arenaria*, E. Mey., but *C. arenaria*, *β mediocris*.

Chironia linoides, Griseb. (1845), has been treated as in 1839, except that an additional variety, *γ Zeyheri*, has been recognised. The plant on which this variety was based (*C. baccifera*, Zeyh., not of Linn.) represents the form which constitutes *C. uniflora*, Eckl., not of Lamk; this latter synonym Grisebach has omitted to transfer from *C. linoides*, Griseb., not of Linn., to his new variety *γ Zeyheri*, Griseb. Except for this omission the treatment

of *C. linoides*, Griseb. (1845), is identical, so far as the plants are concerned, with that adopted by Chamisso in 1831, for *C. linoides*, Griseb. (*C. gracilis*, Salisb.), is *C. vulgaris*, β *intermedia*, Cham.; var. β *longifolia*, Griseb. (*C. linoides*, Linn.), is *C. vulgaris*, α *linoides*, Cham.; var. γ *Zeyheri*, Griseb. (*C. emarginata*, Jarosz), is *C. vulgaris*, γ *lychnoides*, Cham.

Chironia baccifera, Griseb. (1845), has been treated as in 1839, except that var. β *elongata*, E. Mey. (1837), has been correctly reduced to *C. baccifera*, Linn., and var. γ *dilatata*, E. Mey. (1837), has been correctly recognised as a distinct variety.

Chironia serpyllifolia, Griseb. (1845), has been treated as in 1839, except that *C. serpyllifolia*, Eckl. (1830), has been correctly reduced to var. γ *microphylla*, Griseb., and that *C. parvifolia*, E. Mey. (1837), has been also reduced here; in this instance not quite correctly, because only Drège's Van Staadesberg gathering belongs to this variety.

Schoch in his monograph of *Chironia*, published in 1903 (*Bot. Centralbl. Beih.*, xiv., pp. 175–242), has described so carefully the various forms recognised, and has quoted specimens so fully in support of his conclusions that it is unnecessary to do more here than refer briefly to the points as to which these conclusions do not coincide with the results arrived at in the course of the present study. In not a few instances the discrepancies between Schoch's conclusions and those now stated amount to no more than a difference of opinion as regards the limitation of particular species or varieties. It will, however, be found that the authorities quoted by Schoch under individual species have been cited on bibliographical principles rather than as the result of a study of the specimens dealt with by the authors themselves; this circumstance somewhat lessens the utility of his citations for taxonomic purposes.

Chironia baccifera, Schoch (1903), includes *C. baccifera*, Linn.,* and *C. baccifera*, var. *grandiflora*, Griseb. Only one variety, β *dilatata*, Schoch, has been recognised; this variety is not identical with β *dilatata*, E. Mey., since it also includes *C. baccifera*, var. *Burchellii*, a form referred by other authors to *C. baccifera*, Linn., proper.

Chironia serpyllifolia, Schoch (1903), has not been treated precisely as it was by Grisebach, since Schoch has only admitted two forms, corresponding to β *laxa*, Griseb., and γ *microphylla*, Griseb. It is left doubtful which of these may be the original *C. serpyllifolia*.

Chironia pubescens, Schoch (1903), is *C. pubescens*, Bak. (1882), which does not, however, appear to be specifically separable from *C. madagascariensis*, Bak. (1881).

Chironia jasminoides, Schoch (1903), is recognised on bibliographical in preference to morphological considerations. Among the specimens cited, Ecklon n. 176 is *C. scabrida*, var. *ligulifolia* (Grisebach's *C. jasminoides*, var. *lychnoides*); the two MacOwan

* One of the earliest references to this species is that in *Mus. Petiv.*, cent. iv. and v., p. 37, nn. 366, 367; one specimen does duty for both numbers in Herb. Sloane, vol. 156.

specimens—from Durban Road, near Cape Town, not from Natal—are the same. The Muizenberg specimen is *C. maritima*, Eckl. The Lowry's Pass specimen is *C. tabularis* (Meyer's *C. jasminoides*). Schlechter n. 9393 is *C. tabularis*, var. *confusa* (Grisebach's described *C. jasminoides* and the Caledon part of *C. jasminoides*, Cham.). The Knysna and Plettenberg Bay plant is *C. melampyrifolia*, Lamk (the plant described as *C. jasminoides* by Thunberg) ; so, too, is Rust n. 314 from Riversdale. Schoch has made a conscientious and very nearly successful attempt to include, under his *C. jasminoides*, every form to which the name had been applied by Thunberg, Meyer, Chamisso, and Grisebach ; at the same time he has expressly excluded *C. jasminoides*, Lamk, which alone happens to be also the true *C. jasminoides*, Linn.

Chironia tetragona, Schoch (1903), has been treated more nearly as it was treated by Grisebach in 1845 than as it was by Meyer in 1837 or by Grisebach in 1839. Three varieties have been recognised : (1) var. *ovata*, Schoch, narrowed as compared with var. *ovata*, E. Mey. (1837), by the exclusion of all specimens except those with ovate leaves ; (2) var. *linearis*, Schoch, which is practically identical with var. *linearis*, Griseb. (1845), and is therefore narrowed as compared with the original var. *linearis*, E. Mey. (1837), by the exclusion of *C. tetragona*, var. *brevifolia*, Griseb. (1839), and of *C. uniflora*, Lamk. (1783). All specimens intermediate between these restricted varieties, *ovata* and *linearis*, have been treated by Schoch as his (3) typical *C. tetragona*. While it seems, on the whole, preferable to adopt the treatment proposed by E. Meyer in 1837, under which only two varieties are recognised in *C. tetragona*, there is something to be said in favour of the method proposed by Grisebach in 1845, and amended by Schoch in 1903, under which three varieties are recognised. It has, however, to be noted that *C. viscosa*, Zeyh., which Grisebach placed in var. *linearis*, but which Schoch has transferred to his typical *C. tetragona*, does not belong to this species ; it is a form of *C. scabrida*. Among the specimens cited by Schoch, it has further to be remarked that Schlechter n. 9614 is not *C. tetragona*, Linn. f., but *C. tabularis*, Page ; also that Bolus n. 4182 is not *C. tetragona*, var. *linearis*, E. Mey., but *C. tabularis*, var. *confusa*. Finally, it has to be noted that the incidence of the name *C. tetragona*, Schoch, is erroneous ; it is the form which Schoch terms *C. tetragona*, var. *ovata*, that alone constitutes the original *C. tetragona*, Linn. f. ; if the recognition of three rather than of two varieties be accepted, the correct appellation of what Schoch has considered to be typical *C. tetragona* is *C. tetragona*, var. *brevifolia*, Griseb.

Chironia Schinzii, Schoch (1903) is a valid species.

Chironia nudicaulis, Schoch (1903), is partly *C. nudicaulis*, Linn. f. (*C. jasminoides*, δ *tabularis*), but is mainly *C. jasminoides*, Linn., proper. The variety γ *viminea*, established by Grisebach in 1839, has been transferred by Schoch to *C. lychnoides*.

Chironia linoides, Schoch (1903), has been divided into three forms : (1) *C. linoides* proper ; (2) var. *subulata*, Schoch ; (3) var. *brevisepala*, Schoch. As a whole, *C. linoides*, Schoch, is precisely equivalent to *C. lychnoides*, Cham. & Schlecht., not of Berg.,

while the three forms more or less correspond to the three forms recognised by Chamisso and Schlechtendal in 1826, and *C. linoides*, Schoch, therefore definitely excludes *C. linoides*, Linn., except in so far as the citation *Hort. Cliff.*, p. 54, is concerned ; the plant thus cited belongs to the species which Schoch has himself named *C. Ecklonii*. The specimens quoted by Schoch under *C. linoides* proper belong mainly to *C. gracilis*, Salisb. ; a few, however, *e.g.*, Wolley Dod n. 351, belong to *C. emarginata*, Jarosz ; one, collected by Drège, at Wupperthal, in Caledon Div., belongs to *C. Zeyheri*, var. *augustifolia*. Schoch's var. *subulata* is var. *subulata*, E. Mey. (1837), and therefore is *C. gracilis*, Salisb. Schoch's var. *brevisepala* is the plant which Grisebach had separated as var. *Zeyheri* (1845) ; consequently Schoch's varietal name, *brevisepala*, has in any case to be suppressed, and his citation of var. *Zeyheri* has to be transferred from var. *subulata* to the form termed by him var. *brevisepala*. The synonym *C. uniflora*, Eckl., not of Lamk, cited under *C. linoides*, Schoch, proper, has also to be transferred to his var. *brevisepala*.

Chironia scabrida, Schoch (1903), is *C. scabrida*, Griseb. (1839).

Chironia perfoliata, Schoch (1903), is *C. melampyrifolia*, Lamk (1791).

Chironia mediocris, Schoch (1903), is a variety of *C. arenaria*, E. Mey. (1837).

Chironia melampyrifolia, Schoch (1903), is *C. laxa*, Gilg (1898) ; it is *C. melampyrifolia*, E. Mey. (1837), not of Lamk.

Chironia lychnoides, Schoch (1903), is partly *C. lychnoides*, Linn. (*C. jasminoides*, *γ viminea*), and partly *C. elongata*, Eckl. (the narrow-leaved form of typical *C. jasminoides*, Linn., which is also *C. lychnoides*, E. Mey.). It is not, even in part, the true *C. lychnoides*, Berg.

Chironia lancifolia, Schoch (1903), is *C. lancifolia*, Bak. (1890).

Chironia Ecklonii, Schoch (1903), is *C. linoides*, Linn. Schoch has for the first time definitely shown that this species, which corresponds to *C. linoides*, *β longifolia*, Griseb., is entitled to specific rank, and that the supposed intermediate forms between this species and the two species, *C. gracilis* and *C. emarginata*, which together constitute *C. linoides*, Schoch, not of Linn., do not exist. Owing, however, to his employment of the name *C. linoides* for the forms which Linnaeus did not add to his original species till 1767 and 1774, Schoch has been led to propose an unfamiliar name for what is the true *C. linoides*, Linn. Even if Schoch had been right in transferring the name *C. linoides* from the plant to which alone Linnaeus applied it in 1753, the name *C. Ecklonii* was unnecessary ; in the first place, this species has been known in plant-lists since 1893 as *C. ixifera* ; in the second place, this is the plant described in 1767 as *C. lychnoides*, Berg.

Chironia arenaria, Schoch (1903), is *C. arenaria* as described by E. Meyer in 1837 ; it is not, however, the plant described as *C. arenaria* by Grisebach in 1839. Grisebach's *C. arenaria*, as described, is *C. mediocris*, Schoch.

Chironia Schlechteri, Schoch (1903), is *C. laxa*, Gilg (1898).

Chironia Fischeri, Schoch (1903), is *C. floribunda*, Paxt. (1844). The two names were first published together, but the name *C. floribunda* was given precedence.

Chironia maritima, Schoch (1903), is *C. maritima*, Eckl., not of Willd.

Chironia Tysonii, Schoch (1903), is *C. Tysonii*, Gilg (1898). This form is, however, only varietally separable from *C. purpurascens*, Benth. & Hook. f., and the Natal specimens cited by Schoch do not belong to the variety. *C. Tysonii* was based by Gilg on Bolus n. 1290, the specimen of which, at Berlin, is described by Gilg as having all save the primary flowers of its cymes 4-merous; this is not the case with Bolus n. 1290 in Herb. Bolus or in Herb. Kew. Further, Bolus n. 1290 is the same gathering as Tyson n. 2113, and some specimens of this gathering agree exactly with *C. Bachmannii* even as regards foliage, while others agree exactly with *C. purpurascens* proper.

Chironia Bachmannii, Schoch (1903), is *C. Bachmannii*, Gilg (1898). This form, though recognisable, is not however separable, even as a variety, from *C. purpurascens*, Benth. & Hook. f.

Chironia purpurascens, Schoch (1903), so far as the specimens from Griqualand and Natal are concerned, is *C. purpurascens*, Benth. & Hook. f. (1876). But the Matabeleland gathering cited represents *C. humilis*, Gilg, var. *Wilmsii*; the specimens obtained by Whyte in Pondowe, and by Nutt in Fwambo, are *C. laxiflora*, Bak.

Chironia maxima, Schoch (1903), is *C. rosacea*, Gilg (1898).

Chironia latifolia, Schoch (1903), is *C. peduncularis*, Lindl. (1836). It is *C. latifolia*, E. Mey. (1837), not of Donn, as Schoch has said, but Meyer's name was not published, as Schoch has imagined, in 1835.

Chironia erythraeodes, Schoch (1903), is *C. erythraeodes*, Hiern (1898).

Chironia laxiflora, Schoch (1903), is *C. laxiflora*, Bak. (1894).

Chironia densiflora, Schoch (1903), is *C. Krebsii*, Griseb. (1839).

Chironia rubro-coerulea, Schoch (1903), is *C. laxiflora*, Bak. (1894).

Chironia transvaalensis, Schoch (1903), is *C. transvaalensis*, Gilg (1898).

Chironia angolensis, Schoch (1903), is *C. angolensis*, Gilg (1898), so far as the specimens from Tropical Africa are concerned. But Wood n. 1154, from Natal, is typical *C. purpurascens*, Benth. & Hook. f.

Chironia rosacea, Schoch (1903), is *C. rosacea*, Gilg (1898), so far as the Natal specimens cited by Schoch are concerned. The Tropical African specimen cited does not belong to the species, or even to the section.

Chironia humilis, Schoch (1903), is partly *C. humilis*, Gilg (1898), partly *C. Wilmsii*, Gilg (1898), which latter form may be treated as a variety of *C. humilis*.

Chironia Wilmsii, Schoch (1903), is wholly *C. Wilmsii*, Gilg (*C. humilis*, var. *Wilmsii*).

Chironia Baumiana, Schoch (1903), is *C. Baumiana*, Gilg (1903).

Chironia palustris, Schoch (1903), taken as a whole, is *C. palustris*, Burch. Schoch has, however, recognised two varieties—(1) *C. palustris* proper ; (2) var. *radicata*. As to this Schoch was justified ; he has, however, as in the cases of *C. tetragona* and of *C. linoides*, inverted the incidence of the names ; *C. palustris*, var. *radicata*, Schoch, is true *C. palustris*, Burch., while the plant which Schoch has termed *C. palustris* is *C. palustris*, var. *foliata*.

For facility of reference a table of the synonymy of *Chironia* is appended. Three of the synonyms given are doubtful, viz. :— *C. cymosa*, *C. tenuiflora* and *C. dianthiflora*.

Chironia cymosa, Burm. f., *Prodr. Pl. Cap.*, p. 5 (1768), is based on Plukenet, *Mantissa*, 89, pl. 6 ; t. 415, fig. 6 (1700). The specimen, given by Stonestreet, on which the drawing was based, is not now in the Plukenet Herbarium. We can therefore deal only with the drawing. The leaves are shown as penninerved, so that if this character be correct, the plant cannot be a *Chironia*. But we know that other figures of later date than Plukenet's plate, of *Chironia* and *Orphium*, where the venation is palmate, exhibit the same discrepancy ; it may, therefore, be neglected. The facies of the plant represented in the figure is shared by only two species of *Chironia* from South Africa, viz. : *C.* (Hippochiron) *jasminoides*, Linn., and *C.* (Plocandra) *purpurascens*, Benth. & Hook. f. The drawing lays stress on the presence of subulate bracts, a feature that excludes *C. purpurascens*, which was, moreover, not known in the seventeenth century. This feature is in keeping with the characters that mark *C. jasminoides*. There is, however, another discrepancy in the drawing, as compared with *C. jasminoides* ; the calyx-lobes in the drawing are considerably shorter than the corolla-tube. *C. jasminoides* was known about the time that Plukenet's figure was published, for there is a specimen of typical *C. jasminoides* in Sloane's Herbarium, vol. 156, fol. 158, collected by Oldenland, which was accounted for by Ray in 1704 (*Suppl. Append.*, p. 243 ; *Petiv.*, n. 29), as *Centaurium* capense *elatius Pneumonanthen folio* ; therefore, though the difference between the drawing and the plant compels us to consider *C. cymosa*, Burm. f., a doubtful synonym, the probability is that *C. jasminoides* is the species intended. If this be so, the shape of the leaves and the number of the flowers indicate that the particular form intended by the figure is *C. jasminoides* γ *multiflora*.

Chironia tenuiflora, Link *ex* Steud., *Nomencl.*, ed. 2, i. p. 352 (1840) is a name that has not been met with on any specimen in the various collections examined. In some collections, however, there are specimens of that form of *C. gracilis*, Salisb., in which the calyx-lobes are short and rather wide, which were collected by Ecklon, and were in the first instance named by him *C. uniflora*, Lamk. Having discovered his error, Ecklon re-named these specimens *C. tenuifolia*. In his distribution Ecklon has consistently used

the name *C. lychnoïdes* or *C. lychnoidea* (he employed both spellings) for *C. linoides*, Linn., and equally consistently used the name *C. linoides* for *C. linoides* β *subulata*, E. Mey., which is that portion of *C. gracilis* in which the calyx-lobes are narrow and elongated. *C. uniflora*, Eckl., not of Lamk, on sheets issued with printed labels, is the name consistently used by Ecklon for *C. emarginata*; the name *C. tenuifolia* for the form of *C. gracilis* with shorter calyx-lobes was not issued on Ecklon's printed tickets. It is not impossible that this name *C. tenuifolia*, Eckl., may have been misread by Link for *C. tenuiflora*, and may explain the existence of this citation by Steudel. The suggestion is, however, conjectural, and until a specimen named by Link is met with, the synonym must remain doubtful. It may be remarked in connection with this that in Herb. Oxford there is a specimen named by Steudel himself which is of interest as showing (1) that Steudel was among those who appreciated that *C. linoides*, Eckl., not of Linn. (*C. gracilis*), and *C. uniflora*, Eckl., not of Lamk (*C. emarginata*), are, as Ecklon in the field believed them, distinct species; and (2) that Steudel had observed that *C. uniflora*, Eckl., is not the original *C. uniflora*, Lamk, for he has substituted *C. obtusa*, Steud., for Ecklon's name *C. uniflora*. It may also be remarked that the word *tenuifolia* as a varietal name was used both by Harvey and by Prior in connection with *C. baccifera*. Their *C. baccifera* was *C. baccifera*, var. *Burchellii*; to distinguish between this and the form that constitutes the original *C. baccifera* of Linnaeus, they used for the latter the name *C. baccifera*, var. *tenuifolia*.

Chironia dianthiflora, Hort., is a name that apparently only occurs once (*Garden* for 1893, p. 213) in company with names of several other species of *Chironia*, all of which can be accounted for as being then in cultivation. As the other species mentioned exhaust the list of the then cultivated *Chironiae*, the name *C. dianthiflora* should, by exclusion, apply to *Orphium frutescens*, for which species this garden synonym is not inappropriate. There must, however, remain an element of doubt, owing to the absence of any specimen of the plant to which the name was applied.

CHIRONIA, Linn. (1737) emend. R. Br. (1810).

amoena, Salisb. Prodr. 137 (1796) = linoides.

angolensis, *Gilg in Engl. Bot. Jahrb.* xxvi. 104 (1898) Afr. trop.

angolensis, Schoch in Bot. Centralbl. Beih. xiv. 228 (1903) = angolensis; purpurascens.

angustifolia, Sims Bot. Mag. t. 818 (1805) = Orphium frutescens, β.

arenaria, *E. Mey. Comm. Pl. Afr. Austr.* ii. 180 (1837) Afr. austr.

arenaria, Griseb. in DC. Prodr. ix. 40 (1845) = arenaria, β.

baccata, Hoffmgg Verzeichn. Pfl. Nachtr. 211 (1824) = baccifera.

baccifera, *Linn. Sp. Pl.* 190 (1753) Afr. austr.

baccifera, Zeyh. ex Griseb. in DC. Prodr. ix. 41 (1845) = emarginata.

Bachmannii, Gilg in Engl. Bot. Jahrb. xxvi. 103 (1898) = purpurascens.
Bansei, *Prain in Kew Bull.* 1908, 295 (1908) in hortis tantum.
Barclayana, Hort. Berol. ex Griseb. Gen. & Sp. Gent. 100 (1839) = peduncularis.
Baumiana, *Gilg in Warb. Kunene-Sambesi Exped.* 334 (1903) Afr. trop.
caryophylloides, Linn. Cent. ii. 12 (1756) = Orphium frutescens, β.
cymosa, Burm. f. Fl. Cap. Prodr. 5 (1768) = jasminoides, γ; forsan.
decussata, Vent. Hort. Cels t. 31 (1800) = Orphium frutescens.
densiflora, Scott Elliot in Journ. Bot. xxix, 69 (1891) = Krebsii.
dianthiflora, Hort. ex Garden xliv. 213 (1893) = Orphium frutescens; forsan.
Ecklonii, Schoch in Bull. Herb. Boiss. ser. 2, ii. 1013 (1902) = linoides.
elongata, Eckl. Un. It. n. 175 (s. d.) = jasminoides.
emarginata, *Jarosz Pl. Nov. Cap.* 11 (1821) Afr. austr.
erythraeodes, *Hiern in Cat. Welw. Afr. Pl.* i. 709 (1900) Afr. trop.
exigua, Oliv. in Hook. Ic. Pl. t. 1229 (1877) = Sebaea exigua.
Fischeri, Hort. Rollins. ex Paxt. Mag. Bot. xi. 237 (1844) = floribunda.
flexuosa, *Bak. ex Prain in Kew Bull.* 1908, 296 (1908) Afr. trop.
floribunda, *Paxt. Mag. Bot.* xi. 237 (1844) in hortis tantum.
frutescens, Linn. Sp. Pl. 190 (1753) = Orphium frutescens.
fruticosa, Kuntze Rev. Gen. 432 (1891) = Orphium frutescens.
glutinosa, Paxt. Mag. Bot. xv. 245 (1849) = melampyrifolia.
gracilis, *Salisb. ex Prain in Kew Bull.* 1908, 293 (1908) Afr. austr.
grandiflora, Salisb. Prodr. 137 (1796) = Orphium frutescens.
humilis, *Gilg in Engl. Bot. Jahrb.* xxvi. 105 (1898) Afr. trop.; Afr. austr.
humilis, Bak. & Br. in Dyer Fl. Trop. Afr. iv. 1, 555 (1903) = humilis, β.
ixifera, Hort. ex Garden xliv. 213 (1893) = linoides.
jasminoides, *Linn. Pl. Afr. Rar.* 9 (1760) Afr. austr.
jasminoides, Thunb. Prodr. Pl. Cap, i. 35 (1794) = melampyrifolia; tetragona, β; tetragona.
jasminoides, Willd. Sp. Pl. i. 2, 1066 (1797) = tetragona, β.
jasminoides, Edw. Bot. Reg. iii. t. 197 (1817) = tabularis.
jasminoides, Burch. Trav. i. 46 (1821) = jasminoides, δ.
jasminoides, Cham. in Linnaea vi. 344 (1831) = scabrida, β; tabularis, β.
jasminoides, Griseb. Gen. & Sp. Gent. 101 (1839) = melampyrifolia; tabularis, β; tetragona, β.
jasminoides, Schoch in Bot. Centralbl. Beih. xiv. 194 (1903) = scabrida, β; maritima; tabularis, α & β; melampyrifolia.
jasminoides, β, Banks ex Edw. Bot. Reg. iii. sub t. 197 (1817) = scabrida, β.

Krebsii, *Griseb. Gen. & Sp. Gent.* 102 (1839) Afr. austr.
lancifolia, *Bak. in Journ. Linn. Soc.* xxv. 334 (1890) Madagascar.
latifolia, Donn Hort. Cantab. ed. 2, 25 (1800) = Orphium frutescens.
latifolia, E. Mey. Comm. Pl. Afr. Austr. ii. 178 (1837) = peduncularis.
laxa, *Gilg in Engl. Bot. Jahrb.* xxvi. 105 (1898) Afr. austr.
laxiflora, *Bak. in Kew Bull.* 1894, 25 (1894) Afr. trop.
ligulifolia, Salisb. MSS. in Herb. Mus. Brit. (s. d.) = scabrida, β.
linoides, *Linn. Sp. Pl.* 189 (1753) Afr. austr.
linoides, Berg. Descr. Pl. Cap. 43 (1767) = emarginata.
linoides, Thunb. Prodr. Pl. Cap. 35 (1794) = gracilis.
linoides, E. Mey. Comm. Pl. Afr. Austr. ii. 179 (1837) = linoides ; gracilis ; Zeyheri, β.
linoides, Griseb. Gen. & Sp. Gent. 104 (1839) = gracilis ; emarginata.
linoides, Eckl. Un. It. n. 40 (s. d.) = gracilis.
linoides, Schoch, in Bot. Centralbl. Beih. xiv. 202 = gracilis ; emarginata ; Zeyheri, β.
linoides, β, Lamk Encyc. Meth. i. 736 (1783) = gracilis ; emarginata.
linoides, β, E. Mey. Comm. Pl. Afr. Austr. ii. 180 (1837) = gracilis.
linoides, β, Griseb. Gen. & Sp. Gent. 104 (1839) = linoides.
linoides, γ, Griseb. in DC. Prodr. ix. 41 (1845) = emarginata.
lychnoidea, Eckl. Un. It. n. 64 (s. d.) = linoides.
lychnoides, Berg. Descr. Pl. Cap. 45 (1767) = linoides.
lychnoides, Linn. Mantiss. 207 (1771) = jasminoides, β.
lychnoides, Lamk Encyc. Meth. i. 736 (1783) = melampyrifolia.
lychnoides, Thunb. Prodr. Pl. Cap. 35 (1794) = linoides ; maritima ; gracilis, β.
lychnoides, Cham. & Schlecht. in Linnaea i. 190 (1826) = emarginata ; gracilis.
lychnoides, E. Mey. Comm. Pl. Afr. Austr. ii. 177 (1837) = jasminoides.
lychnoides, Schoch in Bot. Centralbl. Beih. xiv. 209 (1903) = jasminoides, α & β.
madagascariensis, *Bak. in Journ. Linn. Soc.* xviii. 273 (1881) Madagascar.
maritima, *Eckl. non Willd. South Afr. Quart. Journ.* i. 370 (1830) Afr. austr.
maritima, Griseb. in DC. Prodr. ix. 39 (1845) = maritima ; laxa.
maritima, β, Griseb. in DC. Prodr. ix. 39 (1845) = floribunda.
maxima, Schoch in Bull. Herb. Boiss. ser. 2, ii. 1014 (1902) = rosacea.
mediocris, Schoch in Bull. Herb. Boiss. ser. 2, ii. 1011 (1902) = arenaria, β.
melampyrifolia, *Lamk. Ill. Gen.* 479 (1791) Afr. austr.
melampyrifolia, E. Mey. Comm. Pl. Afr. Austr. ii. 177 (1837) = laxa.
nudicaulis, Linn. f. Suppl. 151 (1781) = jasminoides, δ.

nudicaulis, β, Eckl. ex Cham. in Linnaea vi. 344 (1831) = jasminoides.
nudicaulis, γ, Griseb. Gen. & Sp. Gent. 99 (1839) = jasminoides, β.
nudicaulis, δ, Eckl. ex Schoch in Bot. Centralbl. Beih. xiv. 210 (1903) = jasminoides, γ.
obtusa, Steud. MSS. in Herb. Oxon. (s. d.) = emarginata.
obtusiflora, Herb. Lugd. Bat. (s. d.) = scabrida, β.
orthostylis, Reichb. Ic. Bot. Exot. 16. t. 245 (1830) = Orphium frutescens.
ovata, Spreng. ex Griseb. in DC. Prodr. ix. 41 (1845) = serpyllifolia.
palustris, *Burch. Trav.* ii. 226 (1824) Afr. austr.
palustris, Hook. f. in Bot. Mag. t. 7101 (1890) = palustris, β.
palustris, Gilg in Warb. Kunene-Sambesi Exped. 334 (1903) = transvaalensis.
parviflora, Salisb. Prodr. 136 (1796) = baccifera.
parvifolia, E. Mey. Comm. Pl. Afr. Austr. ii. 180 (1837) = serpyllifolia.
peduncularis, *Lindl. Bot. Reg.* t. 1803 (1836) Afr. austr.
Peglerae, *Prain in Kew Bull.* 1908, 297 (1908) Afr. austr.
perfoliata, Eckl. in South Afr. Quart. Journ. i. 370 (1830) = melampyrifolia.
pubescens, Bak. in Journ. Bot. xx. 172 (1882) = madagascariensis, β.
purpurascens, *Benth. & Hook. f. Gen. Pl.* ii. 805 (1876) Afr. austr.
purpurascens, Rolfe in Oates, Matabeleland, ed. 2, 404 (1889) = humilis, β.
purpurascens, Schoch in Bot. Centralbl. Beih. xiv. 219 (1903) = purpurascens ; humilis, β ; laxiflora.
rosacea, *Gilg in Engl. Bot. Jahrb.* xxvi. 104 (1898) Afr. austr.
rosacea, Schoch in Bot. Centralbl. Beih. xiv. 229 (1903) = rosacea ; angolensis.
rubro-coerulea, Gilg in Engl. Bot. Jahrb. xxx. 379 (1901) = laxiflora.
scabra, Krauss MSS. (s. d.) = scabrida, β.
scabrida, *Griseb. Gen. & Sp. Gent.* 103 (1839) Afr. austr.
Schinzii, *Schoch in Bull. Herb. Boiss.* ser. 2, ii. 1010 (1902) Afr. austr.
Schlechteri, Schoch in Bull. Herb. Boiss. ser. 2, ii. 1010 (1902) = laxa.
serpyllifolia, *Lehm. Ind. Sem. Hort. Hamb.* 1828, 16 (1828) Afr. austr.
serpyllifolia, Eckl. in South Afr. Quart. Journ. i. 371 (1830) = serpyllifolia, γ.
speciosa, E. Mey. Comm. Pl. Afr. Austr. ii. 178 (1837) = melampyrifolia.
tabularis, *Page Prodr.* 121 (1817) Afr. austr.
tenuiflora, Link ex Steud. Nomencl. ed. 2, i. 352 (1840) = gracilis ; forsan.
tenuifolia, Eckl. MSS. (s. d.) = gracilis.
tetragona, *Linn. f. Suppl.* 151 (1781) Afr. austr.

tetragona, Schoch in Bot. Centralbl. Beih. xiv. 196 (1903) = tetragona, β.
tetragona, β, Griseb. in DC. Prodr. ix. 40 (1845) = tetragona, β ; tabularis.
tetragona, β, Schoch in Bot. Centralbl. Beih. xiv. 197 (1903) = tetragona.
tetragona, γ, Griseb. in DC. Prodr. ix. 40 (1845) = tetragona, β ; scabrida, β.
transvaalensis, *Gilg in Engl. Bot. Jahrb.* xxvi. 104 (1898) Afr. trop. ; Afr. austr.
trinervia, Hort. ex Ann. Fl. & Pom., 158 (1834) = peduncularis.
trinervis, Hort. ex Loud. Encyc. Pl. Suppl. ii. 1306 (1830) = peduncularis.
Tysonii, Gilg in Engl. Bot. Jahrb. xxvi. 104 (1898) = purpurascens, β.
uniflora, Lamk Encyc. Meth. i. 737 (1783) = tetragona, β.
uniflora, Eckl. Un. It. n. 75 (s. d.) = emarginata.
Verdickii, *De Wildem. Études Fl. Congo*, ii. 3, 338 (1908) Afr. trop.
virgularis, Salisb. MSS. (s. d.) = emarginata.
viscosa, Zeyh. ex Griseb. in DC. Prodr. ix. 40 (1845) = scabrida, β.
vulgaris, α, Cham. in Linnaea vi. 343 (1831) = linoides.
vulgaris, β, Cham. in Linnaea vi. 343 (1831) = gracilis.
vulgaris, γ, Cham. in Linnaea vi. 343 (1831) = emarginata.
Wilmsii, Gilg in Engl. Bot. Jahrb. xxvi. 105 (1898) = humilis, β.
Zeyheri, *Prain in Kew Bull.* 1908, 295 (1908) Afr. Austr.

D. Prain.

XLVI.—MISCELLANEOUS NOTES.

Mr. Alexander Hislop, formerly a member of the gardening staff of the Royal Botanic Gardens, and afterwards successively Assistant Superintendent of the Municipal Gardens, Queenstown, Cape Colony, and Curator of the Pietermaritzburg Botanic Society's Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Curator in the Agricultural Department of Southern Nigeria.

Kew Bulletin: Additional Series, VIII.—As already recorded in the *Kew Bulletin* for 1906, p. 276, the late Mr. C. B. Clarke, who gave the greater part of his time during nearly twenty years of his life to a critical study of the natural order *Cyperaceae*, became by degrees the recognised authority on this family, to whom botanists of every nationality sent their collections from all parts of the world for identification. The work Mr. Clarke had in view was the preparation of a monograph of the family. This monograph, though complete so far as references to material submitted to him for study are concerned, was still unpublished when he died. For reasons explained in the preface to the work under

review, the complete issue of the manuscript was found to be impracticable. At the same time it was found that a few of the genera and a considerable number of the species described in Mr. Clarke's manuscript had never been published. The specimens in the Herbarium at Kew which represent these unpublished species are authentically named by Mr. Clarke ; other herbaria contain specimens of at least some of these species, also authentically named by him. The names attached being, however, *nomina nuda*, are not readily available for use in the routine work of botanical determination, and, although in time doubtless the various names employed by Mr. Clarke might be expected to be taken up and provided with diagnoses by other workers, it seemed advisable, since the issue of the whole of the manuscript was not immediately practicable, to render generally available the actual descriptions given by their author of these unpublished species. The work of editing these descriptions has been undertaken by Mr. B. Daydon Jackson, who has bestowed on it all the pains that characterise his labours and all the solicitude that might have been anticipated on the part of a warm personal friend of the lamented author.

In presenting the diagnoses of these new genera and species, the scheme of arrangement followed has been that devised by the late Mr. Clarke so far as material for it exists in the manuscript. To make the scheme more intelligible, it has been appended in skeleton form to the descriptions now published.

An examination of Mr. Clarke's manuscript reveals the fact that he preserved all written sheets, however long he had discarded them ; and, in many genera he had evolved more than one scheme of arrangement, with subordinate groups whose names were some times modified without the explanation that would, no doubt, have been forthcoming had Mr. Clarke lived to see his labours through the press. The early part of the manuscript has received revision on several occasions, but the later portions are left less complete. In the genus *Carex* his groups received various names as his ideas developed. His views of groups or their names were not always consistent ; "series" are found to be higher and also lower than "sections" ; where this latter treatment is adopted by the author, the editor has used the word "sub-series" in place of "series." This is, however, almost the only case in which any change has been effected ; the author's work has been presented as close to the original manuscript as could be done. In *Eleocharis* and in *Rynchospora*, and thrice in *Carex*, there are double names, and in *Rynchospora* is a name which is admittedly a *Dichromena*. In *Fimbristylis* a note indicates that one species is out of place, and must be removed. At the end of each genus are what the author termed "residuary species"—those as to which he had not satisfied himself of their validity or affinity. These, as a rule, are ignored, the exceptions being when they bear numbers, or are new species, as in *Carex*. The numbers are those employed by the author, and his own intercalations are shown uniformly as *bis*, *ter*, &c.

Some years before his death Mr. Clarke had printed 144 plates, with corresponding text ; as these plates largely explain his views,

it is to be hoped that they may be issued to the public, as supplementary to these *New Genera and Species of Cyperaceae*, now issued as the eighth volume of the *Kew Bulletin, Additional Series*.

Botanical Magazine for August.—The plants figured and described are: *Caesalpinia japonica*, Sieb. et Zucc., *Indigofera hebepetala*, Benth., *Eucryphia cordifolia*, Cav., *Rhododendron kamtschaticum*, Pall and *Polystachya Lawrenceana*, Kraenzl., all from specimens which have flowered at Kew. *Caesalpinia japonica* was introduced into this country from Japan by Messrs. James Veitch & Sons, and flowered for the first time in their Coombe Wood nursery in 1887. It is hardy only in sheltered positions in the south of England. The material used for the illustration was produced by a plant growing in a recess under the south wall of the Temperate House. *Indigofera hebepetala*, a species widely distributed in the North-Western Himalaya, is not generally known in gardens, although it has been in cultivation at Kew since 1881, when it was received with many other plants as a bequest by the late Mr. G. C. Joad. It is hardy at Kew, where its crimson and rose-coloured flowers, borne in long axillary racemes, are produced freely during August and September. *Eucryphia* is an ornamental-flowering shrub from South Chile, which thrives out of doors in the milder parts of the British Isles. Its large white flowers have the appearance of those of a *Philadelphus*, and the Saxifragaceae, amongst several other orders, has been considered by botanists to contain the nearest affinities to the genus, which, in several respects, is an anomaly. It is now placed in a separate order—the Eucryphiaceae—near to Ternstroemiaceae. The plant flowered in Messrs. Veitch's Coombe Wood nursery in 1897, though it appears to have been first introduced in 1848 (not in 1878 as stated in the Magazine). The *Rhododendron* is a very small undershrub, only about 6 in. high, with rather large bright carmine-purple flowers. It is a native of North-Eastern Asia and North-Western America, and though quite hardy in Britain it is not easily cultivated. The Kew plants were raised from seed received from the Imperial Botanic Garden, St. Petersburg, in 1900. *Polystachya Lawrenceana* is an East Tropical African species singular amongst all those in cultivation in having a rose-pink lip which renders the plant much more attractive than most of its congeners. The plant figured was received from the Royal Botanic Garden, Glasnevin, in 1903, and flowered in June, 1906.

Madagascar Rubber Plants.—In "Le Caoutchouc et la Gutta Percha," of 15th June, 1908, Prof. H. Jumelle gives an account of two rubber plants of the Fort-Dauphin Division (cercle), Southern Madagascar, known to the natives as "Vahyvanda" and "Kidroa" respectively. These had not hitherto been determined botanically, but were dealt with under their native names by Jumelle in the supplementary chapter of his book, "Les Ressources Agricoles et Forestières des Colonies Françaises" (Marseille, 1907). The account there given was based on information supplied by

Capt. (now Commandant) Vacher, who was in charge of the Tsivory District (secteur) of Southern Madagascar from 1904 to 1907.

The two species have now been identified by Jumelle, from specimens collected by Sergeant Maurière, at the instigation of Commandant Vacher ; "Vahyvanda" as *Plectaneia elastica*, Jum. et Perr., and "Kidroa" as "*Mascarenhasia lisianthiflora*, DC. Neither species appears to be of much economic importance, and their chief interest is rather geographical and ecologic. At the most favorable estimate a native would take seven or eight days to collect a kilogramme of the rubber during the good season, April–June, and twice that time during October-November.

Plectaneia elastica was previously known only from the forest of Analamahitso, Haut-Bemarivo, North-West Madagascar, and it is somewhat surprising to find it in the extreme south of the island. In the Fort-Dauphin Division, according to Capt. Vacher, *P. elastica* grows into a bush 2½–5 ft. high, if there are no trees on which it can climb ; as a climber, however, it reaches the tops of the highest trees, but the stem nevertheless remains slender, hardly exceeding 1½ in. in diameter. In North-West Madagascar, on the other hand, Perrier de la Bathie saw stems measuring as much as 8 in. in diameter at the base. The same relation holds good for *Mascarenhasia lisianthiflora*, which in the south is a shrub 6–12 ft. high, with a stem about 1½ inch in diameter, whilst in the north-west it may become a tree 20 ft. high, with a trunk 8 in. in diameter. As a general rule, according to Jumelle, the species of North-West Madagascar become dwarfed as they approach the south of the island or the central plateau, and this relation extends even to representative species : thus *Cryptostegia grandiflora* of Southern Madagascar is a smaller plant and yields less rubber than *C. madagascariensis*, the corresponding species in the north-west.

The altitudinal distribution of *Plectaneia elastica* and *Mascarenhasia lisianthiflora* is the same in both parts of the island, the height of 2600 ft. (800 metres), being the lower limit of *P. elastica* and the upper limit of *M. lisianthiflora*.

T. A. S.

Experiments with Rubber Seeds.—Experiments have been carried out by Mr. H. F. Macmillan, Curator, and Mr. T. Petch, Government Mycologist, Peradeniya, as to the weight and germinative capacity of *Hevea* rubber seed.

The seed was collected from (A) a group of trees about 20 years old which had never been tapped and from (B) a group of trees about 30 years old which were tapped regularly in 1905 (29 lbs. of dry rubber being taken from eight trees in three months), occasionally in 1906, but not at all in 1907. One thousand seeds were taken from each group, and each 1,000 were divided into 10 lots of 100 each, which were weighed separately. One lot from each group was planted on September 14th, and the remaining lots were planted in pairs, after weighing at intervals of a week, until all were planted. It was found that the seeds lose weight rapidly during the first fortnight after collection, and then more gradually

till about the sixth week, after which time their weight remains more or less constant unless they are transferred to a drier atmosphere. The loss in weight appears to be due almost entirely to loss of water.

One thousand fresh seeds from untapped trees weighed on an average 4,126·83 grains or 9·1 lbs., and this figure agrees with results obtained by Mr. Carruthers five years previously.

The loss in weight takes place almost entirely from the kernel.

The seeds from group B weighed, when fresh, on an average 3,540·8 grains, which is 7·8 lbs., as the weight of 1,000 seeds from tapped trees.

It was from these trees that Mr. Carruthers obtained his seed in 1902; thus for

Group B.

1902 ... Untapped trees ... Weight of 1,000 seeds = 9·1 lbs.
1905 ... Trees tapped.
1907 ... ... Weight of 1,000 seeds = 7·8 lbs.

Group A.

1907 ... Untapped trees ... Weight of 1,000 seeds = 9·1 lbs.

It is also stated by a planter that 1,000 seeds from his trees (15 years old) formerly weighed 10 lbs., but now they average 7 lbs., having diminished 1 lb. each year during tapping.

From the experiment it was clear that the seeds from tapped trees are smaller, weigh less per 1,000 seeds, are actually denser, but lose more weight in drying than those from untapped trees.

With regard to the germination tests, it was found that seeds from untapped trees were practically worthless if kept longer than two weeks, but that the seeds of tapped trees keep better, and both in percentage of germination and time of germination are better than seeds from untapped trees. These results of course apply only to germination, and as yet there is no indication as to the quality of the trees which would result from the two sets of seeds.

The full details of the experiments are given in Circular No. 11 of the *Circulars* and *Agricultural Journal* of the Royal Botanic Gardens, Ceylon, vol. iv., for May, 1908. In the tables which are included for both groups the weights of the different lots of seeds and the percentage and time of germination is given. The circular concludes with a reference to the estimates of the return to be obtained by extracting oil from *Hevea* seed. Calculations have been made on the assumption that 1,000 seeds weighed 11 lbs. (Wright) and 9·1 lbs. (Carruthers), whereas from tapped trees 8 lbs. appears to be the more correct estimate for the weight of 1,000 seeds.

When dry and shipped to England the kernels constitute about 50 per cent. by weight of the whole seed and yield 42·3 per cent. of oil.

From these figures 280,000 fresh seeds or 350,000 dry seeds (yielding 700,000 kernels) = 1 ton.

The value of the kernels may be about £10 per ton.